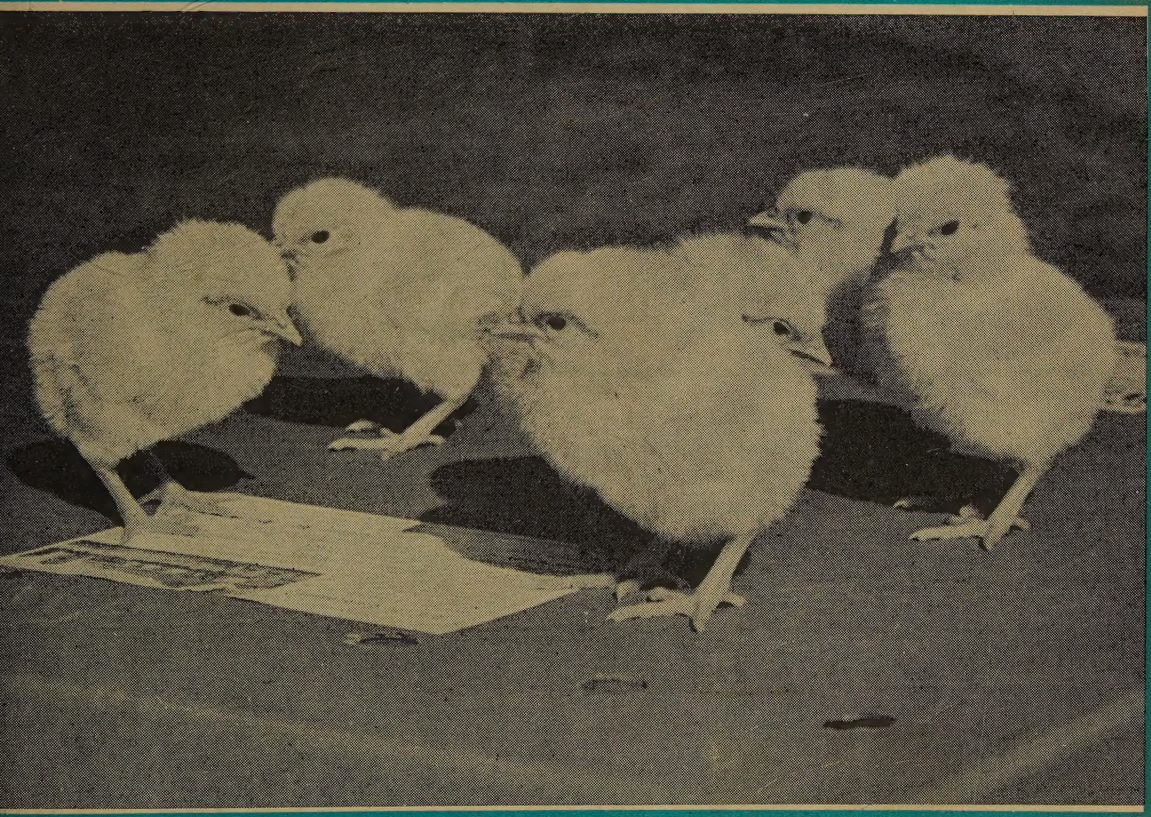
The JOURNAL of AGRICULTURE

COMMONWEALTH INST.
ENTOMOLOGY LIBRARY
28 AUG 1952
SERIAL Aus. 30
SEPARATE

WESTERN AUSTRALIA.



VOL. 1. No. 3.
(THIRD SERIES)

MAY-JUNE, 1952

PRICE 1/-

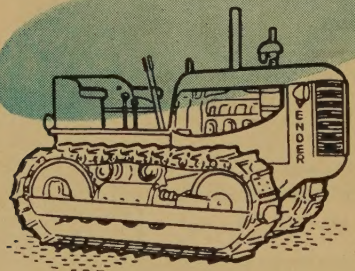
Registered at the G.P.O. Perth, for transmission by post as a periodical

Reasons why...

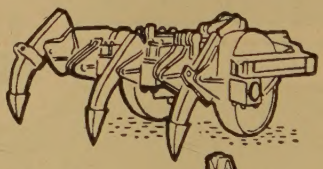
We invite you to visit

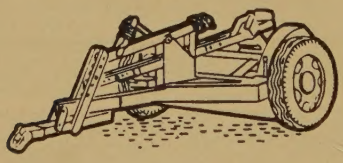
AGRICULTURAL PARTS SUPPLY CO. LTD.

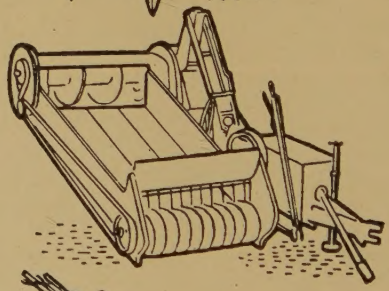
When in Perth...

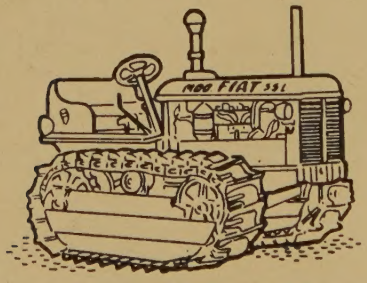


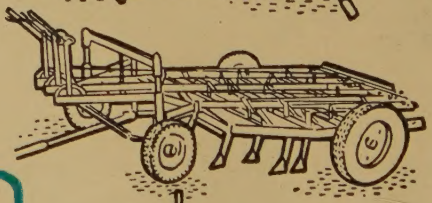
BECAUSE Industrial and Agricultural Contractors and Farmers will be interested in VENDER, FIAT and DAVID BROWN Crawler Tractors and FREIGHTER TRAC QUIP Industrial Equipment.



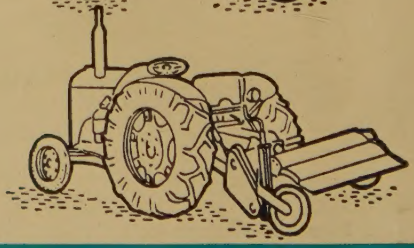








BECAUSE Farmers and Contractors will want to inspect Salopian Scarifiers, Pickup Balers, Mowers, Rakes, Brinkworth Loaders, and especially the David Brown range of Wheel Tractors and Power-controlled Implements.



AGRICULTURAL PARTS SUPPLY Co LTD

234 – 240 PIER ST. PERTH PHONE B2468

The JOURNAL of THE DEPARTMENT OF AGRICULTURE

WESTERN AUSTRALIA

ISSUED BY DIRECTION OF THE MINISTER FOR AGRICULTURE

VOL. I (Third Series) MAY-JUNE, 1952 No. 3

CONTENTS

Foreword	G. K. Baron Hay	iii
On the Trail of the Dingo	A. R. Tomlinson and A. G. Moore	277
More Beef from the Kimberleys—Part 2	G. A. Smith	287
Cattle-Working Yards	G. A. Smith	295
Applying Orchard Fertilisers—A Home-Made Aid	H. S. Argyle	299
Control of Swarming	R. S. Coleman	301
Citrus Growing in W.A.	H. R. Powell	307
Actinomycosis and Actinobacillosis	J. Shilkin	309
Vibriosis Recorded in South-West Herds	J. Craig	313
Strainer Posts and Fence Patterns	J. A. Mallett	315
Reduction of Pre-Harvest Drop of Oranges	N. J. Halse	327
Seasonal Reminders for July-August		331
Snails and Slugs	C. F. H. Jenkins	341
Oriental Fruit Moth	C. F. H. Jenkins	349
Incubator Hygiene	J. E. Peterson and A. R. Wright	353
Cultivation of the Cape Gooseberry	R. L. Cailes	363
The Farm Breakfast	H. M. Gloster	367
Meringued Apples	H. M. Gloster	371
Water Erosion Control—Part 2	L. C. Lightfoot	373
Planning Boosts Poultry Profits	K. D. Giles	381
Wheat Crop Competitions	I. Thomas and H. G. Cariss	385
New Cereal Varieties in Australia	I. Thomas and J. Reeves	391
Dahlias—Lifting and Storing the Tubers	F. Jackson	395
Plant Your Roses Carefully	C. C. Hillary	401
Here's the Answer		403
Obituary—Mr. E. T. Morgan		409
Departmental Leaflets and Bulletins		411
Sunrise and Sunset Tables		416

Published two-monthly by the Department of Agriculture, St. George's Terrace, Perth.
Edited by J. A. MALLETT.

By Authority: W. H. WYATT, Government Printer, Perth 55091/5/52—10m.

THE DEPARTMENT OF AGRICULTURE
of
WESTERN AUSTRALIA

Minister for Agriculture:
THE HON. SIR CHARLES LATHAM, M.L.C.

Director of Agriculture:
G. K. BARON HAY, B.Sc. Agric.

Deputy Director of Agriculture:
A. L. McKENZIE CLARK, L.V.Sc.

Chief Administrative Officer:
C. C. HILLARY

Controller of Abattoirs.—T. C. ROWLANDS.
Registrar of Brands.—A. R. TOMLINSON, A.F.I.A.
Rural Economic Adviser.—R. P. ROBERTS, M.Sc. (Agric.).
Chief Clerk.—W. M. KIRK.
Apiculturist.—R. S. COLEMAN.
Editor, "Journal of Agriculture."—J. A. MALLETT.
Librarian.—MISS A. E. M. WHITE, B.A.

BOTANICAL BRANCH

Government Botanist and Curator of State Herbarium.— C. A. GARDNER.
Botanist.—R. D. ROYCE, B.Sc. Agric.

DAIRY BRANCH

Superintendent of Dairying.—M. CULLITY, B.Sc. Agric.
Assistant Superintendent.—H. G. ELLIOTT, Diploma of Agric. (University).
Agrostologist.—F. E. RYAN, B.Sc. Agric. (Hons.).
Agricultural Advisers.—K. NEEDHAM, B.Sc. Agric.; B. WILLIAMS B.Sc. Agric.; D. N. TULLOCH, B.Sc.; K. M. HOPE, B.Sc. Agric.; R. G. BETTENAY, B.Sc. Agric. (Denmark); A. SHARP, Diploma of Agric. University (Bunbury); S. L. DILKES, B.Sc. Agric. (Wokalup); P. W. R. TRAVERS-DRAPES, B.Sc. Agric. (Busselton); A. E. BAKER, B.Sc. Agric. (Manjimup); A. W. HOBBS, B.Sc. Agric. (Bridgetown).
Dairy Produce Inspector.—A. H. HOBBS, H.D.D.
Dairy Inspectors.—N. INGLETON, M.D.D.; G. W. R. SCOTT, M.D.A., M.D.D.; H. J. WEST; D. C. MICKLE, F.I.D.M. (Bunbury); V. B. MONTI, M.D.A. (Hons.), M.D.D. (Margaret River); J. T. McNALLY (Manjimup); H. MASLIN, M.D.D. (Capel); K. FRUIN, M.D.D. (Waroona).
Pure-Bred Herd Recorders.—J. A. DARRAGH; G. D. BASTYAN.
Research Station Managers.—V. WESTON, H.D.D. (Denmark); K. W. SIMES, M.D.A. (Wokalup).

ENTOMOLOGICAL BRANCH

Government Entomologist.— C. F. H. JENKINS, M.A.
Senior Entomologist.—P. N. FORTE, B.Sc. Agric.
Entomologists.—D. G. SHEDLEY, B.Sc. Agric.; B. A. B EDWARDS, B.Sc. (Hons.); R. G. LUKINS, B.Sc.; MISS J. ROBERTSON, B.Sc.; J. BUTTON, B.Sc. Agric.

HORTICULTURAL BRANCH

Superintendent of Horticulture.—H. R. POWELL, B.Sc. Agric.
Assistant Superintendent.—T. C. MILLER, B.Sc. Agric.
Acting Assistant Superintendent.—F. MELVILLE B.Sc. Agric.
Viticulturist.—H. K. JOHNS.
Acting Assistant Viticulturist.—W. R. JAMIESON.
Packing Instructor.—J. S. BLOOMFIELD.
Advisers.—S. HARDISTY, B.Sc. Agric.; S. de BEAUX, B.Sc. Agric.
Senior Instructor.—T. HERLIHY.
Instructors.—R. G. CAHILL (Bridgetown); A. BRIMSON (Chittering); L. G. HAYWARD (Mundaring); R. L. CAILES (Kalamunda); H. ARGYLE (Kelmscott-Armadale); J. C. ROWBOTHAM (Donnybrook); W. J. RENNICK (Manjimup); A. T. GULVIN (Albany); V. CAHILL (Nannup, Codlin Moth eradicator).
Inspectors.—J. F. S. MAUNSELL (Port); J. SLAMON (Port); E. H. RAWSON (Markets); W. WEIR (Markets); N. COSGRAVE (Kalgoorlie).
Senior Fruit Fly Inspector.—E. H. ELKINGTON.
Fruit Fly Inspectors.—A. FORSYTH (Metropolitan); C. A. WRIGHT (Metropolitan); A. B. THOMAS (Metropolitan); F. JACKSON (Metropolitan); G. DIGNEY (Piniarra); N. BROCKMAN (Donnybrook); I. RENNIE (Harvey); L. NEAVE (Kalamunda); W. CAMPBELL (Mundaring); J. ROLINSON (Swan); C. MACPHERSON (Chittering); W. WARDELL-JOHNSON (Fremantle); A. O. WELLS (Kelmscott); S. WILLIAMS (Bunbury).

IRRIGATION BRANCH

Officer in Charge.—H. J. K. GIBSONE.
Assistant Officer in Charge.—G. GAUNTLETT, B.Sc. Agric.
Technicians.—G. C. BROWN; H. B. WILSON, M.D.A.; A. H. BOSCH, Dip. Tropical Agric. (Amsterdam).

MURESK AGRICULTURAL COLLEGE

Principal.—W. SOUTHERN, B.Sc. Agric., Dip.Ed.
Assistant Principal and Senior Lecturer.—J. TULLOCH, B.Sc.
Lecturer in Agriculture.—A. J. T. MARSHALL, B.Sc. Agric . B.A., M.D.A.
Lecturer, House and Sports Master.—B. F. DRISCOLL.
Factory Superintendent and Lecturer.—H. M. LISTER, F.I.D.M.
Farm Manager and Demonstrator.—H. A. LOVEGROVE, M.D.A.
Assistant Lecturer in Agriculture.—J. WALKER, B.Sc. Agric.

NORTH-WEST BRANCH

Officer in Charge.—W. M. NUNN, B.Sc. Agric.
Tropical Adviser.—W. D. S. MARR (Carnarvon).
Agricultural Advisers.—K. FITZGERALD, B.Sc. Agric. (Kimberley); H. SUYDENDORP, B.Sc. Agric. (Abydos); J. R. M. WOLFE, B.Sc. Agric. (Port Hedland).
Cattle Adviser.—G. A. SMITH (Broome).
Research Station Managers.—R. G. NAILARD (Gascoyne); N. A. BRETT-YOUNG (Kimberley).

PLANT PATHOLOGY BRANCH

Government Plant Pathologist.—W. P. CASS SMITH, B.Sc. Agric.
Senior Plant Pathologist.—H. L. HARVEY, B.Sc. Agric.
Plant Pathologists.—MISS O. M. GOSS, B.Sc.; R. F. DOEPEL, B.Sc. Agric.

POULTRY BRANCH

Officer in Charge.—R. H. MORRIS, B.Sc. Agric., M.D.A.
Advisers.—D. K. GILES, B.Sc. Agric. (Hons.), M.D.A. (Hons.); L. J. GAFFNEY, B.Sc. Agric.
Instructors.—H. Cole, A. R. WRIGHT.
Inspector.—H. WILSON.

RESEARCH BRANCH

Chief Plant Nutrition and Research Officer.—T. C. DUNNE, B.Sc. Agric., Ph.D. (Calif.).
Senior Plant Nutrition and Research Officer.—L. T. JONES, B.Sc. Agric.
Research Officers.—S. T. SMITH, B.Sc.; J. A. PARISH, B.Sc. Agric.; N. J. HALSE, B.Sc. Agric.; E. N FITZPATRICK, B.Sc. Agric.

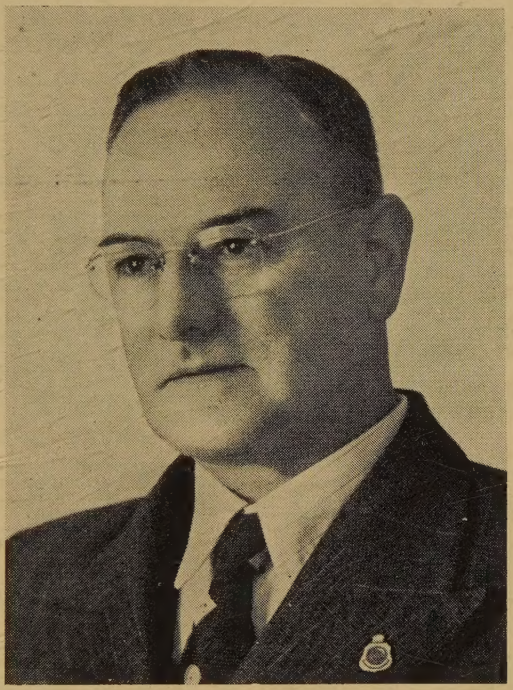
(Continued on Page 4)

FOREWORD

By G. K. BARON HAY, B.Sc. (Agric.), DIRECTOR OF AGRICULTURE

AGRICULTURE, from its very nature, must be a living, growing force that is always seeking to advance. Any approach to a feeling of self-satisfaction and a readiness to merely maintain the existing conditions must lead to stagnation and eventual retrogression.

Historically, a sound, progressive and prosperous agricultural industry is an integral part of an economically sound State; any departure from a healthy condition in agriculture is rapidly reflected in the general well-being of the community.



THE DIRECTOR OF AGRICULTURE

It is a recognition of this special place occupied by agriculture which has influenced the community to undertake, on behalf of the farmer, certain activities not normally granted to other industries.

The existence of a Department of Agriculture in almost every country—with trained staffs to investigate problems affecting the industry and to make the resulting information readily available to the farmers—is one of the practical illustrations denoting the importance of the farming industry to the general community.

The achievements of research in agriculture are enormous and could be still greater if the knowledge gained was universally put into practice. However, it is not unusual to regard somewhat lightly those things which may be obtained with little or no expense and a major problem has always been to find the most effective method of extending technical advances into the practical field.

Here in Western Australia, our farmers—in close co-operation with the technical services provided by the State—have developed a system of agriculture particularly suited to conditions in this corner of the Continent, but even today, in every district, there is an astonishing difference in average output between farms of similar productive capacity.

This is a challenge, not only to the Department of Agriculture, but to all agriculturists, and its solution would add immensely to both our rural production and the economic stability of the industry.

Success depends upon creating a demand from farmers for the knowledge which is available, and this may be achieved in full only by the closest co-operation of the research and technical staffs of the Department of Agriculture, farmers' organisations and individual farmers.

It is conceded that this desire to keep abreast of ever-changing techniques in agricultural practices has existed, in some measure, for many years. It is my hope, however, that by expanding the services through which the farmer obtains his information, the average levels of agricultural production in Western Australia may be raised still higher.

SHEEP AND WOOL BRANCH

Sheep and Wool Adviser.—W. L. McGARRY.
Sheep and Wool Instructor.—J. REILLY.
Shearing Instructor.—M. BUTLER.

SOIL CONSERVATION BRANCH

Commissioner of Soil Conservation.—G. H. BURVILL, M.Ag.Sc.
Assistant Commissioner.—L. C. LIGHTFOOT, B.Sc. Agric.
Advisers.—J. P. FALLON, B.Sc. Agric.; D. J. FLEAY, B.Sc. Agric.; G. W. SPENCER, B.Sc. Agric.; J. E. WATSON, B.Sc.; B. a'B. MARSH, B.Sc. Agric.; T. C. STONEMAN, B.Sc. Agric.
Clearing Control Inspector.—W. BRYAN, M.D.A.
Technicians.—W. M. DINNIE, M.D.A.; R. J. van HAFTEN, Dip. Agric.

TOBACCO BRANCH

Tobacco Adviser.—T. G. HANEY, B.Sc. Agric.
Manager Research Station (Manjimup).—D. C. FOURACRES.

VEGETABLE BRANCH

Officer in Charge.—E. T. MORGAN.
Assistant Officer in Charge.—J. P. ECKERSLEY, B.Sc. Agric.
Instructors.—J. C. PALMER, Dip. Agric.; B. N. LOWE; M. HARDIE.
Inspectors.—F. H. TONKIN; J. STEELE.

VERMIN CONTROL BRANCH

Chief Vermin Control Officer and Chairman, Agriculture Protection Board.—A. R. TOMLINSON, A.F.I.A.
Assistant Chief Vermin Control Officer—J. S. CRAWFORD.
Senior Vermin Control Officer.—C. MARSHALL.
Research Officer.—C. D. GOODING, B.Sc. Agric.
Vermin Control Officers.—C. K. BLAIR (Northern Areas), A. G. MOORE (Southern Areas), R. J. FRASER (North-West), G. E. MILES (Upper Great Southern), H. HART (Northern Agricultural Areas). B. T. F. EVANS (Coastal Areas), A. W. COOPER (Midland Areas), A. G. VEITCH (Central Wheatbelt), S. M. HARVEY (South-West).

VETERINARY BRANCH

Chief Veterinary Surgeon and Chief Inspector of Stock.—C. R. TOOP, B.V.Sc. (Hons.).
Assistant Chief Veterinary Surgeon.—E. F. TWADDLE, M.R.C.V.S.
Veterinary Surgeons.—R. HARLEY, M.R.C.V.S. (Bunbury); J. SHILKIN, B.V.Sc.; J. CRAIG, M.R.C.V.S.; K. PROCTOR, B.V.Sc.
Stock Inspectors.—A. D. SEDGWICK; J. F. ROBINSON; S. COOK; A. K. SLATTER; B. D. HOOPER; C. R. DIXON; A. L. RIPPER (Bunbury); E. G. McKENZIE (Kalgoorlie); A. READ (Bridgetown); N. W. FROOME, (Wagin); J. J. FREETH (Kellerberrin); E. S. M. SMITH (Geraldton); D. BARKER (Derby); E. C. GOLDRING (Wallal); A. K. AITKEN (Midland Junction); J. A. B. ROSE (Moora).
Principal, Animal Health and Nutrition Laboratories.—H. W. BENNETTS, D.V.Sc.
Animal Nutrition Officer.—L. C. SNOOK, D.Sc. (Aberdeen), B.Sc. Agric. (Hons.).
Assistant Animal Nutrition Officer.—I. C. MILLER, B.Sc. Agric.
Veterinary Pathologist.—J. E. PETERSON, B.V.Sc.
Manager Bramley Research Station.—N. A. SCOTT, M.D.A.

WEEDS AND SEEDS BRANCH

Officer in Charge.—G. R. W. MEADLY, M.Sc.
Botanists.—B. J. QUINLIVAN, B.Sc. Agric.; G. A. PEARCE, B.Sc. Agric.
Weed Control Officers.—C. V. CAHILL; J. N. HUTCHINSON, M.D.A.; W. H. JOHNSON; N. S. MARR; K. RYAN.

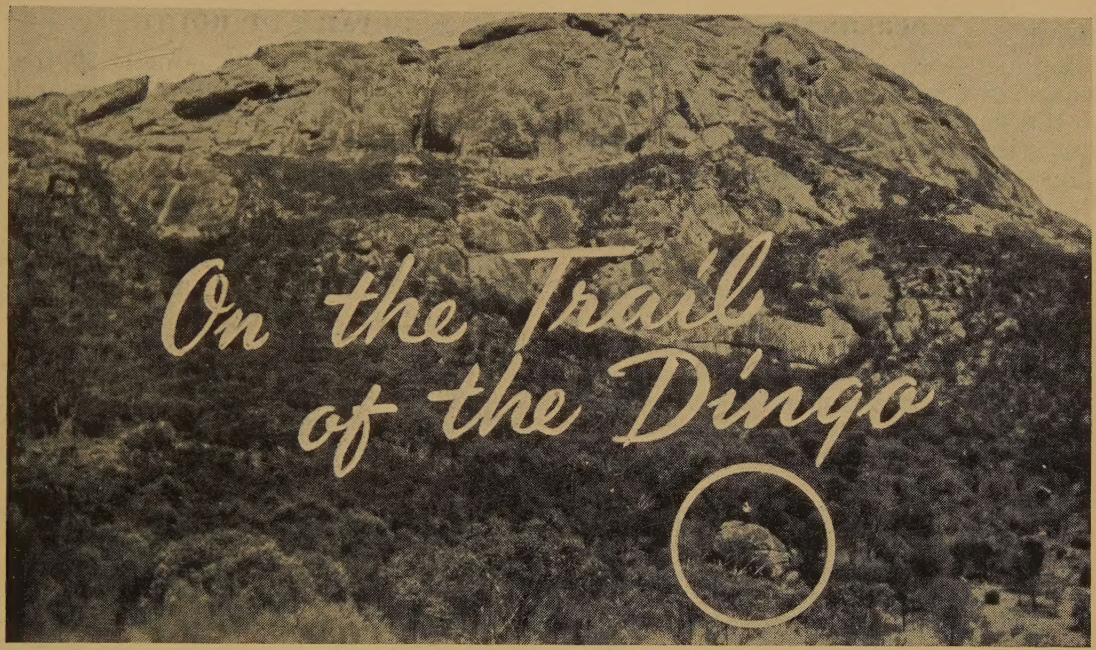
WHEAT AND SHEEP BRANCH

Superintendent of Wheat Farming.—I. THOMAS.
Assistant Superintendent.—F. L. SHIER, B.Sc. Agric.
Advisers.—G. L. THROSSELL, B.Sc. Agric. (Geraldton): N. DAVENPORT, B.Sc. Agric.; H. G. CARISS, B.Sc. Agric.; H. G. NEIL, B.Sc. Agric. (Moora); L. D. WHITE, B.Sc. Agric.; W. P. CULLINANE, B.Sc. Agric.; T. E. McDOWELL, B.Sc. Agric. (Katanning); J. A. C. SMITH, B.Sc. Agric.; D. J. KIRTON, B.Sc. Agric.; J. T. REEVES, B.Sc. Agric.; B. F. CARLIN, B.Sc. Agric.; C. M. RALPH, B.Sc. Agric.
Instructor.—J. W. GILCHRIST, M.D.A.
Research Station Managers.—W. A. HUMAN (Avondale); F. A. NEWMAN (Chapman); F. C. F. GISHUBL (Merredin); R. L. DOWN (Salmon Gums and Esperance Plains); R. D. BATEMAN (Wongan Hills).

ARE YOU ON OUR MAILING LIST?

"THE Journal of Agriculture of Western Australia" is posted free of charge to bona fide farmers. If you are a farmer and would like to receive the Journal, write to the Editor, "Journal of Agriculture," Department of Agriculture, Perth, giving your name and address (block letters please) together with your location number.

Non-farmers may receive the Journal (six issues a year at two-monthly intervals) on payment of an annual subscription of 5s.



On the Trail of the Dingo

Peak Charles, about 30 miles west of Salmon Gums, is known to be a breeding area for dingoes which find ample water and shelter in caves on the Peak. Note size of man standing on rock in white circle.

By A. R. TOMLINSON, Chairman, Agriculture Protection Board,
and
A. G. MOORE, Vermin Control Officer

A SUCCESSFUL motorised expedition to collect information on the breeding areas and migratory movements of wild dogs was completed in March of this year. This was the second expedition of this nature organised by the Agriculture Protection Board and much valuable information was obtained which should simplify the work of the Board's doggers in the guarding of the sheep-breeding areas.

Information available in the Vermin Branch had indicated that, while well-defined breeding areas existed along the southern rivers between Ravensthorpe and Esperance, there was also some movements of dogs towards settlements from the vast uninhabited expanses south of Southern Cross between the No. 1 Rabbit Proof Fence and the Kalgoorlie-Esperance railway line.

Numerous requests had been received by the Board for aerial baiting to be carried out in these areas but the Board decided that it would be advisable to obtain more information by ground exploration before embarking upon extensive poisoning campaigns.

Following upon the success of the first expedition sent by the Agricultural Protection Board to investigate wild dog migrations on the Nullabor Plains, it was decided that a second expedition should investigate the country east of the Kalgoorlie-Esperance railway line and as far as Israelite Bay to check on any westerly movements of wild dogs along the coast from the Nullabor Plains.

PERSONNEL

Vermin Control Officer, A. G. Moore, who is in charge of dogging operations in the southern areas was the leader of this second expedition. He was accompanied by Mr. W. G. Cooper and Mr. W. Bartlett, both of whom are experienced Protection Board doggers.

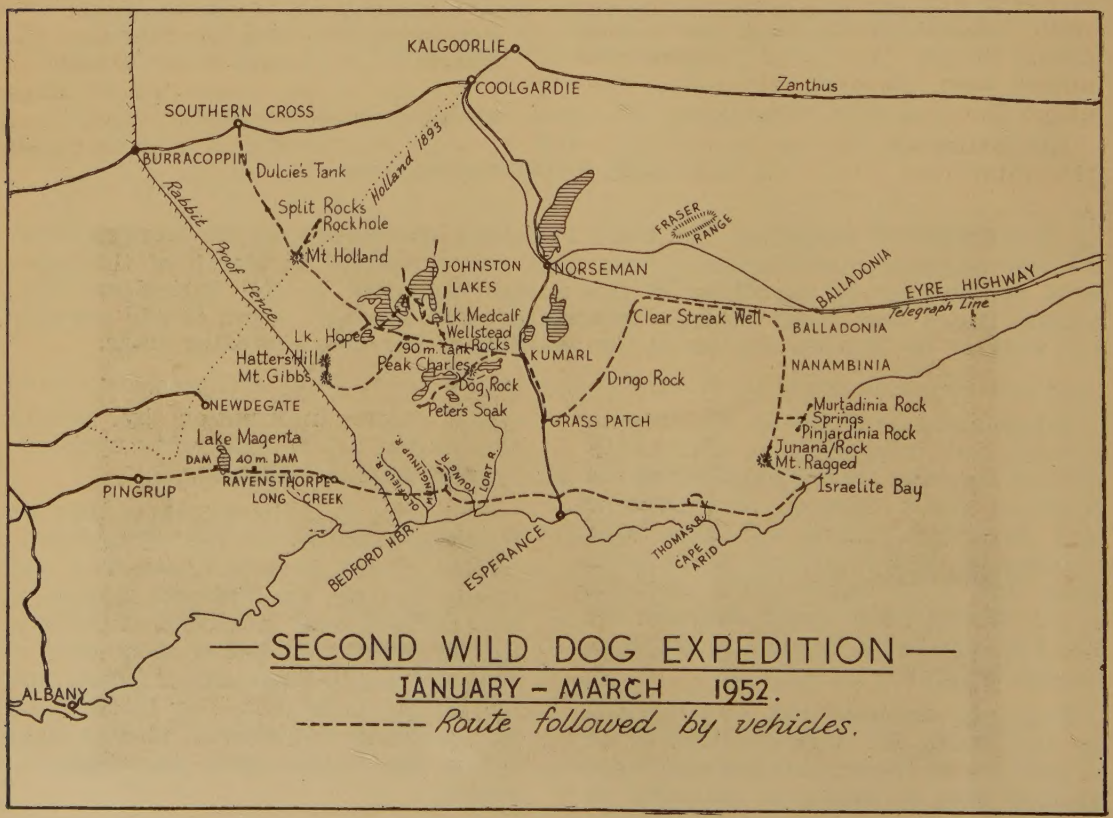
The party travelled in the special five-ton International truck and the Willys jeep maintained by the Board for exploring outback areas. These vehicles carried supplies of water, fuel, food, baiting materials, etc., and also a Traeger wireless transceiver which was used for keeping the party in radio contact with Kalgoorlie.

The jeep travelled 2,327 miles and the truck 1,536 miles during the tour and although they were held up by 28 punctures both vehicles performed well without any mechanical troubles.

DETAILS OF ROUTE

After leaving Perth on January 30, the party travelled to Southern Cross and moved southward via Dulcie's Tank to Mount Holland and then south-easterly to Lake Hope near the Johnston Lakes. Dog tracks were observed at several points along the route particularly in the vicinity of Mount Holland and Lake Hope. A remarkably well-hidden waterhole used by wild dogs was located to the north-east of Mount Holland.

Exploratory trips were made to the south-east to Hatters Hill and Mount Gibbs near the Rabbit Proof Fence, and deviations were made to the east and north-east around and across portions of the Johnston Lakes. Signs of dogs were noticed on these trips including a well-frequented section near Mount Gibbs where water was plentiful, and also in



the vicinity of Lake Medcalf and Wellstead Rocks where rock water-holes were found.

Travelling was continued eastward along the Lake King-Norseman Road and then the expedition turned south-westerly along the Ravensthorpe Road to Peak Charles, Dog Rock and on to Peter's Soak. Dog tracks were observed along these roads and signs of frequent visits by dogs were found at a dam and rock-holes near Peak Charles and Dog Rock.

The journey eastward was resumed and the Kalgoorlie-Esperance railway line was joined at Kumarl and followed down to Grass Patch. From Grass Patch the expedition travelled in a north-easterly direction for about 80 miles towards the Fraser Range, turning due east near Clear Streak Well and travelling along the Balladonia telegraph line. The first wild dog signs observed were about 60 miles along this route. Some tracks were found near Clear Streak Well and innumerable others were observed along the telegraph line.

Approximately 60 miles along the telegraph lines (about 110 miles east of the railway line) the expedition turned southward through Balladonia and Namanbinia Stations to Mount Ragged and then south-easterly to Israelite Bay.

No dog tracks were observed after leaving the telegraph line until south of the station properties at Junana Rocks. Hard areas to the north of the rocks were covered with a form of needle-grass which probably discouraged the dogs from travelling over this country. From Junana Rocks the coastal plains commenced and dog signs became increasingly numerous.

From Israelite Bay the expedition travelled westward to Esperance and it was evident that wild dogs were plentiful up to about 40 miles east of the port.

The return trip was made along the south coast through Ravensthorpe to Pingrup and then to Perth. Dog tracks were found near the Lort, Young and Oldfield Rivers and a breeding area was located at the head of the Munglinup River. Some signs were noticed along the Ravensthorpe-Pingrup Road near Long Creek, the 40-mile dam, and Lake Magenta dam.

Measuring the depth of water holes at Lake Medcalf. Dingoes water here.

The Commonwealth Bank offers the most comprehensive range of trading bank services available in Australia. Such services include cheque accounts, finance for primary production and other facilities helpful to the man on the land.

In addition each year the Bank makes large donations to further research into many aspects of primary production. It also makes advances to marketing boards and co-operative societies so that the man on the land may receive early payment for his products.

The Commonwealth Bank is owned by you, it operates in your interests. For every trading bank service make use of the friendly co-operation available to you at all Branches.

FIXED DEPOSITS
CHEQUE ACCOUNTS
HOUSING LOANS
LETTERS OF CREDIT
TRAVELLERS' CHEQUES
COMPLETE TRADING BANK SERVICES

COMMONWEALTH BANK

"The Bank You Own"

SERVING THE PEOPLE IN ALL THE STATES

INFORMATION GAINED

It was shown that wild dogs were breeding in the areas between the No. 1 Rabbit Proof Fence and the Kalgoorlie-Esperance railway line. There appears to be ample water for them and most of their movements appear to be along well-defined roads or tracks. Thick scrub renders travelling elsewhere almost impossible. It is already known that there is a migration from these areas into the eastern Great Southern districts and it is now felt that it will be possible to cope with the movement by ground or aerial baiting.

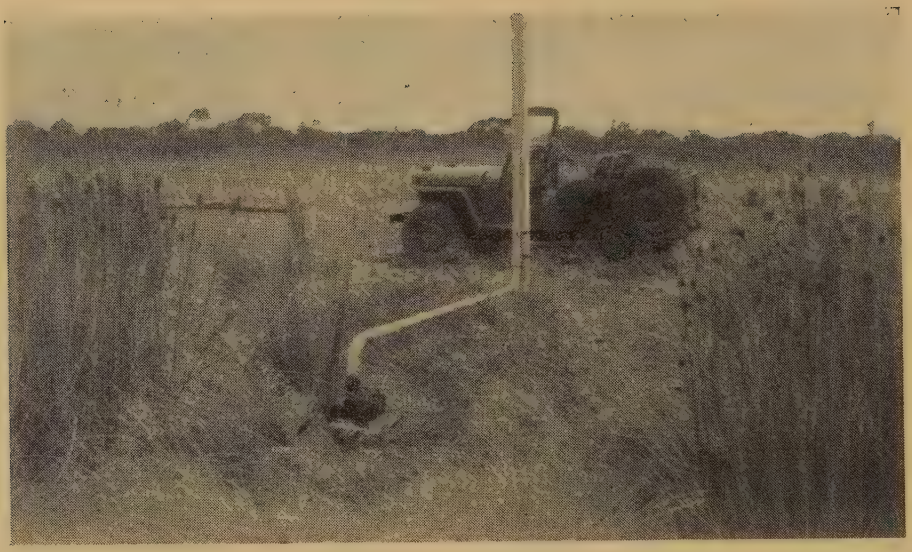
To the east of the railway line there appears to be a definite east-west route used by dogs which runs south of the Fraser Range and north of Namanbinia extending in the direction of the Nullabor Plains.

South of this route, there appears to be a gap of about 70 miles over country unsuitable for dogs and then a well-defined breeding area along the coastal plains between Israelite Bay and a point 40 miles east of Esperance.

Dogs would probably drift from the northerly route westward and possibly others will move west from the south coast. However, although it was evident that a large number of dogs were breeding on the coast there was no evidence of any large-scale migration towards the west. Even when major invasions of the Nullabor Plains occur from the north, movement in this direction may be discouraged by unfavourable travelling country and the presence of the Esperance township and also one occupied property, the owner of which is particularly active against dogs across the route towards Esperance.

It is considered that as rabbits and kangaroos are numerous along the coast to the east of Israelite Bay there is probably a tendency for dogs to move in that direction, particularly if seasonal conditions on the Nullabor Plains have been favourable. It must be borne in mind that dog movements are influenced by the normal annual changes in the seasons, and there is a tendency

Gnamma holes at Wellstead Rocks. A good supply of natural water is accessible to dingoes.



Pump and stand-pipe at Welcome Soak on the old Ravensthorpe-Norseman Road. Bush animals cannot water here although there is an abundance of good water in the well.

for them to scatter at the fall of the first winter rains, due to the attractions of food and water in various areas.

The well-used route along the telegraph line and the coastal breeding grounds will be dealt with by ground baiting.

By studying the information gained from this expedition in conjunction with the Nullabor Plains explorations it seems that large-scale migrations from the areas to the north of the Plains may be dealt with in the routes already located. This could be done by extensive trapping such as has been undertaken in the past by private individuals, or by wholesale baiting which the Agriculture Protection Board has planned for the future. The two potential danger areas revealed by the second expedition should lend themselves to successful control by heavy ground baiting.

OBSERVATIONS ON OTHER VERMIN

Kangaroos were found to be plentiful to the east of Mount Holland at Welcome Soak, Dingo Rocks and Clear Streak Well. A few were noticed at Israelite Bay and they were again plentiful from the Thomas River to Esperance and along the Young and Lort Rivers to the west of the port.

Wild camels in small numbers were watering at Clear Streak Well and goat tracks were seen at Lake Medcalf.

Foxes were numerous at Israelite Bay and a few were noted at the south-western end of Johnston Lakes, also south of Lake Tay. Emus were plentiful at Dingo Rocks, Thomas River and the Johnston Lakes and a group of 20 was seen at the 40-mile dam on the Ravensthorpe-Esperance Road.

Rabbits were plentiful to the east of Mount Holland, a few were seen at the south-western end of the Johnston Lakes and at Clear Streak Well. They were quite numerous at Welcome Soak, at springs to the south of Namanbinia Station and along the coastal plain from Israelite Bay to Esperance. Large numbers were seen at Thomas River and also along the Young and Lort Rivers west of Esperance.

DAILY DIARY OF THE TRIP

By A. G. MOORE.

January 31.—Dulcies Tank. Several prospectors here and wild dogs unable to get water as tank roofed over. When travelling south, two dogs followed the road for several miles to Split Rock. Only water here is that caught in rock depressions—supplies drying up. No other tracks seen except those of emus between Split Rock and Mount Holland.

February 1.—Making baits and repairing truck tyre. Walked two miles up Holland's track—no water accessible to dingos at Mount Holland but small gnamma holes accessible to birds contained about 100 gallons. Well-defined dog beats to water holes from Holland's north-east track. Government tank still without roof, and cement tank dry. Eight hundred baits made.

February 2.—Travelled 20 miles north-east on Holland's track and discovered small rock hole about three miles from Mount Holland where dogs were watering. Dog tracks picked up and followed about two miles. On return detoured southward and ran into salt flats and ti-tree grassland. Tracks of kangaroos, rabbits and dogs plentiful with well-defined beats from lake to lake. Laid 300 baits. Road very rough and overgrown and had to mend three punctures en route.

February 3.—Shifted camp from Mount Holland to Lake Hope. Road fair. No water. Cement tank at 50 mile roofless and dry. Dog tracks and scratchings over most of the road especially in the lakes area. Many fallen trees across road slowed our progress and it took from 9.30 a.m. to 6.30 p.m. to cover 56 miles. Five hundred baits laid. Made detour of three miles over lake using the jeep.

February 4.—Explored Johnston Lake north-east of camp. Owing to recent rains lakes were too boggy for the jeep and we bogged twice so moved off the lakes. Dingo tracks scarce. Emus plentiful and some rabbits and foxes seen. Fifty baits laid.

February 5.—Exploring north-east of Johnston Lake travelled 37 miles in jeep and found two places where dogs were watering. Old road quite good except for fallen trees. One thousand one hundred and fifty baits laid. Four granite outcrops inspected but no water found.

February 6.—Travelled west of Lake Hope to Hatters Hill south to Norseman Road and east to 90 mile tank. Two patches where dogs were plentiful. One between Hatters Hill and Lake Hope, another at Mount Gibbs. Plenty of water at Mount Gibbs. Bartlett and self laid 1,270 baits using the jeep. Cooper took camping gear across to 90 mile tank on the Norseman Road. Dog tracks seen in Lakes area and 200 baits laid.

February 7.—Shifted camp from 90 mile tank on Lake King-Norseman Road to Lake Medcalf east of Bremer Range. Dingos plentiful for several miles along the road south and north of Wellstead Rocks where plenty of water accessible for animals and birds. Laid 650 baits. Road very narrow and winding and entailed much axe-work to enable truck to get through.

February 8.—No travelling. Made 2,000 baits. Repairing tyres and transceiver.

February 9.—Travelled eight miles north-east and 29 miles north-west. Dogs watering at Lake Medcalf rock holes on south end of lake. Tried to reach Wheeler Rock Road but prevented by rocks and scrub. Laid 600 baits. Saw dog tracks and goat tracks crossing end of Lake Medcalf.

February 10.—Shifted camp to Dock Rock and explored Peak Charles. Two dingos had been watering at rocks six miles north of Peak Charles but no dogs at the peak itself. Some scratchings at Dog Rock. Country generally not suitable for bush animals being too scrubby and thick to hunt food. Laid 250 baits.

February 11.—Possibly same dogs scratched at Dog Rock are also watering at dam and rocks to the north. Laid 325 baits.

February 12.—Travelled with jeep westward along old Ravensthorpe-Norseman Road 32 miles from Dog Rock, two miles past Peter's Soak which was dry. Dingos travelled in ones and twos along patches of the road but they were unable to find water to which animals had access. In the area of Welcome Soak, rabbit and kangaroo tracks were seen. Water plentiful in the soak inside rabbit netting fence and in a covered well with pump and standpipe. More fox tracks seen around large lake north of soak. Laid 950 baits.

The jeep under the roof catchment of the 90-mile Tank between Lake King and Norseman. An excellent supply of cool rainwater here which is inaccessible to animals.

On the old road from Grass Patch to Fraser Range. The road (?) lies straight ahead of the jeep and is completely overgrown. The expedition had to cut and force its way through about 70 miles of this type of country.

February 13.—Broke camp from Dog Rock and tried to get through to George Rocks but road had to be abandoned after three miles of very rough travelling. Travelled to Kumarl. Three hundred baits laid. Truck and Cooper stayed at Circle Valley while Bartlett and self took jeep with empty drums to Esperance.

February 14.—Obtaining supplies from Esperance and vulcanising jeep tube.

February 15.—Return to Grass Patch with supplies and joined up with Cooper and the truck. Pushed on to Government tank 40 miles north-east of Grass Patch. No sign of dogs along this road.

February 16.—As it rained all night had difficulty in finding and clearing right road.

February 17.—Travelled to old Fraser Range Road and inspected first tank at Dingo Rock but only dog signs were very old ones. Kangaroos and emus plentiful. Truck bogged three times. Laid 100 baits.

February 18.—Travelled 31 miles along Fraser Road which was hard to find in places being badly overgrown. First dog scratchings seen since leaving Grass Patch. Laid 100 baits.

February 19.—Travelled 21 miles over burnt country with road difficult to follow. Found two dogs, kangaroos and camels watering at Clear Streak Well. Kangaroos plentiful and some rabbits. Old and new dog tracks seen along telegraph line road—three or four dogs had recently travelled east along this road. Laid 350 baits.

February 20.—Travelled 103 miles. Dingo tracks plentiful for about 30 miles along Balladonia telegraph line particularly in Lakes country. One freshly-killed kangaroo seen and stopped to poison carcass. No dog tracks seen since turning south towards Israelite Bay. Laid 700 baits along telegraph line.

February 21.—Travelled 24 miles east to springs and on to Muntadinia and Pinjardinia Rocks. One dog track and some old scratchings at springs. Plenty of water. Dogs and rabbits numerous. Too much needle grass in this country for dogs to run on. Three hundred baits laid.

February 22.—Travelled to Israelite Bay. Dingo tracks started at Junana Rocks along the road and tracks and scratchings numerous on the plains at Russell Range. Also right through to Israelite Bay. Saw a young dog on the sandhills. Rabbit, fox and dog tracks seen around sandhills and on the beach. Six dog tracks seen going east along the beach from the bay. Laid 800 baits

February 23.—Dogs had been plentiful over area west of Israelite Bay. Three kangaroos seen and rabbits plentiful. General trend of dog tracks is eastward. One thousand three hundred baits were laid.

The truck bogged down in sand on the old Fraser Range Road.

February 24.—Dingoes plentiful to Jenanullup Creek but none seen from there to Thomas River. Emus, kangaroos and rabbits plentiful at Thomas River, but no dogs. Laid 750 baits.

February 25.—Travelled 28 miles on old Mount Ragged road then travelled west and back to camp. Dingo tracks and scratchings over most of the plain and dogs had been watering on outcrops of granite at Boyatup Hill. Dogs seem to be keeping to the two-year-old burnt plain country rather than the thickly wooded Thomas River area. Probably this rabbit-infested area is visited at night by dogs. One emu shot and carcass poisoned. Laid 400 baits.

February 26.—Travelled through to Esperance. Dog tracks and scratchings plentiful at swamps 40 miles from Esperance where they were possibly attracted by water and newly-burnt country. Kangaroos more plentiful. Laid 700 baits.

February 27.—Travelled to head of Young River. Saw one dog track at Lort River and two along Vermiculite Road west of Young River. Kangaroos and rabbits plentiful. Laid 83 baits.

February 28.—Head of Young River inspected but this area not seriously infested with dingoes—I estimate only two dogs. One hundred baits laid here. At head of Munglinup River four dogs were seen and signs indicated six or eight dogs. They had bred there this season. Three hundred baits laid.

February 29.—Travelled to Ravensthorpe and laid 300 baits en route. Saw some dog tracks in the Oldfield River area.

March 1.—Ravensthorpe, Magenta, Pingrup Road. Dingo tracks plentiful—first soak dry. South of Long Creek two dogs were seen and one shot. Dog pads observed along creek and at a well where they had been obtaining water. Rabbits were plentiful and we saw 20 emus watering at 40 mile dam. Tracks of four dogs at the dam. Laid 950 baits.

March 2.—Travelled to dam west of Lake Magenta. No dog tracks through Magenta but one had been watering at dam. No dogs on an abandoned farm south-west of Magenta. Laid 400 baits.

March 3.—Both Sullivans and Greenshields soaks were dry. Only saw occasional dog tracks along road. No tracks at rock dam eight miles east of Pingrup. Laid 700 baits through this area of travel. This completed reconnaisance, and vehicles travelled to Katanning. Baits laid, 13,608.

DAMS ON HILLSIDES

A READER of the "Journal of Agriculture" recently wrote to the Commissioner of Soil Conservation concerning the current tendency towards sinking dams on hillsides. He stated that many farmers and contractors were throwing up holding banks in such a manner that a large percentage of the water impounded was lost by seepage under the banks.

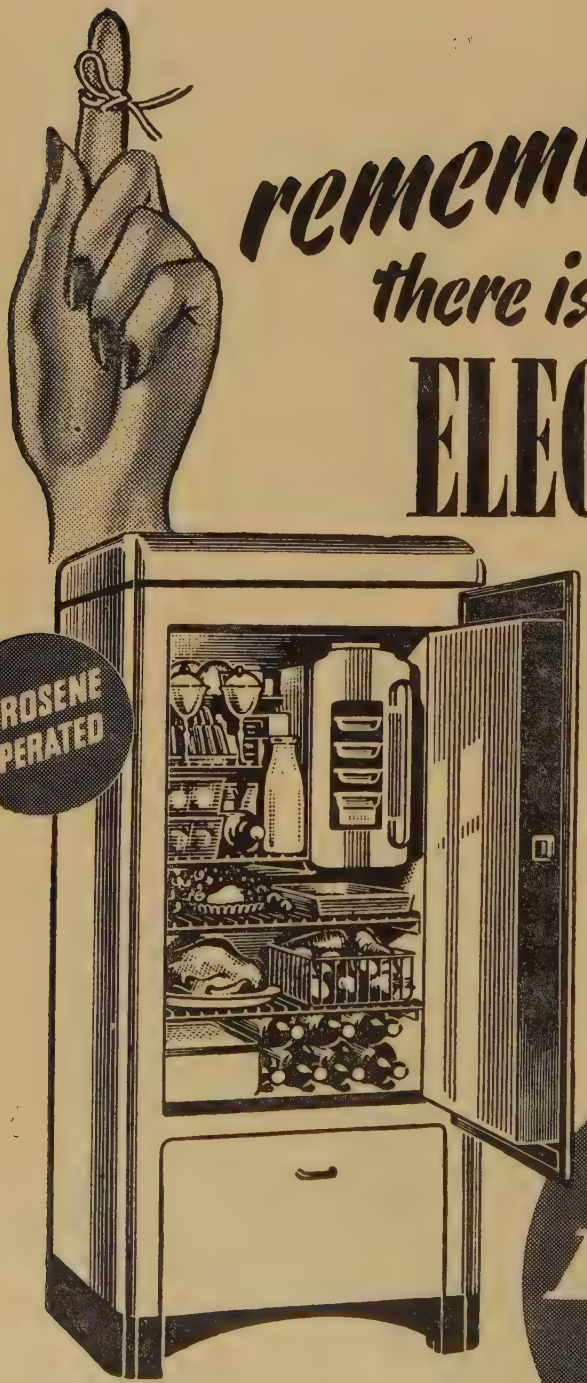
The letter was referred to the Hydraulic Engineer, Public Works Department, who has commented as follows:—

"Where dams are constructed on sidling ground, it is the practice of this Branch to store water in bank to save excavation or alternatively conserve more water.

"Before the bank is commenced, the natural surface below where it will be is stripped of all growth, loose and/or sandy soil. This is done by dozer blade and the spoil pushed well out of the way. The depth of overburden removed depends on local conditions, but is rarely less than one foot. The exposed surface is then scarified by ripper or plough to a depth of at least six inches. Construction of the bank is then commenced. Excavation is usually done by tractor and scoop and the material is spread evenly over the bank in layers of about six inches. Where excavation is done by dozer, the material is similarly blended evenly and not left in heaps. Every effort is made to traffic the tractor and scoop over all the bank as many times as possible to assist consolidation, even to the extent of carrying the full load along the bank rather than taking the shortest track. These precautions materially add to the imperviousness of the bank.

"The slopes of the bank are roughly 2½ to 1 and a good top width, up to 10ft., if possible, is allowed. Usually there is ample material to make a good wide bank. Berms of up to 20ft are usually allowed although some dams have been constructed with only 10ft. berms. It is found that over the years, however, material from the banks is washed into the dams if the berms are too narrow."

remember!
there is only one
ELECTROLUX



For Consistent Efficiency in any climate

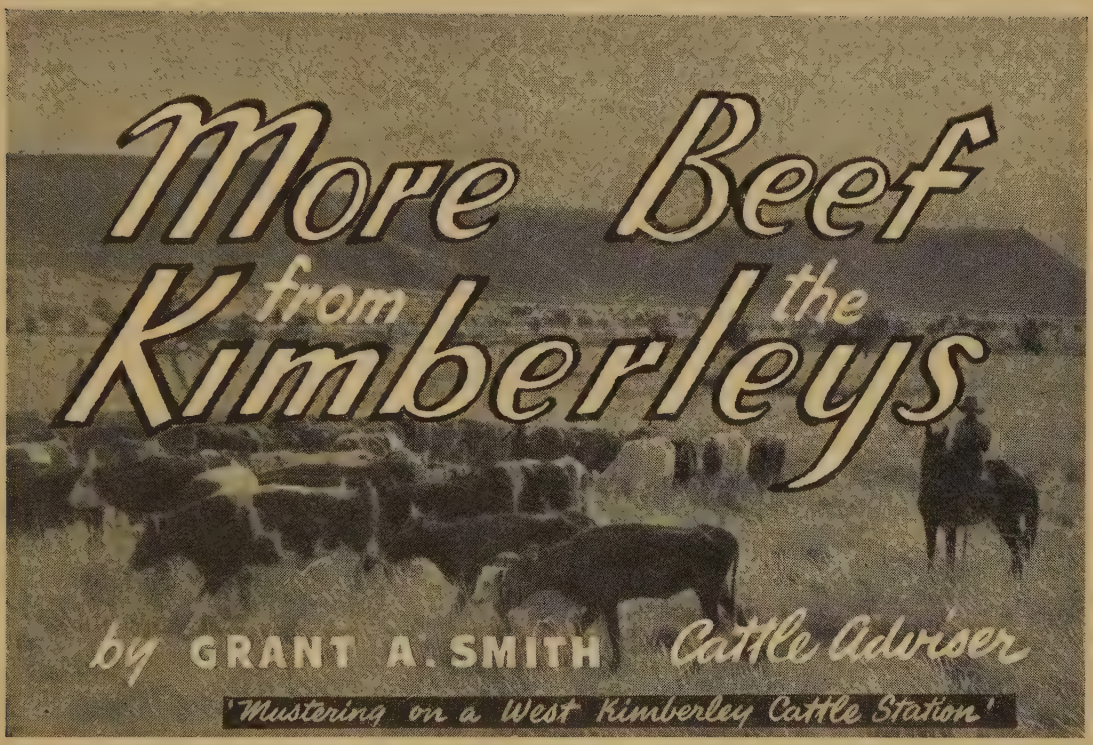
Best in Refrigerator Value

Cash Price . . .
£119/15/–
(Terms if required)

DELIVERY NOW!

Write or call us
—or see local agent
regarding delivery

Dalgety
AND COMPANY LIMITED
15 William St., Perth
DISTRIBUTORS



LOW phosphorus content and low protein content of pastures usually go hand in hand and as most dry feed is deficient in both of these important nutritional needs, it is easy to understand why our Kimberley cattle do well in the "wet" when ample green feed is available, but fall away rapidly in condition as the feed dries out. Increasing the protein content is essentially a long-term project, but I feel that the remedying of phosphorus deficiency is an economic possibility, which could be put into effect fairly rapidly.

This is the second and final instalment of this article, the first portion of which appeared in the March-April issue.

In South Africa where research programmes were conducted in a district possessing climatic and seasonal conditions nearly identical with those of the Kimberleys, it has been shown that phosphorus is a limiting factor in the growth of young stock, the condition of the older animals, and the milk yield of the cows.

It was found that where young calves were given a phosphorus-rich supplement in the form of bonemeal, their rate of weight increase was approximately twice that of the control cows given no supplement. Starting with animals from nine to 18 months old with an average weight of 300 lb., the control animals running on natural pasture with no supplement gained an average of 170 lb. in one year. The other group, running on the same pastures over the same period, but given bonemeal to supply extra phosphorus, made an average gain of 340 lb. in the same period. With this increase in weight, was associated earlier maturity and better quality beef.

GRUBBING

TREES AND STUMPS

and doing speedily what is otherwise slow and laborious work

Tremendous power exerted by

The Monkey Grubber

tears them quickly and cleanly from the earth with roots intact. A thorough and workmanlike job, and the unrivalled method of dealing with your timbered land.

A GRUBBING MACHINE equipped with cable of correct length, size and weight for ease of handling and embodying such features as multiple speeds, automatic releasing gear, rope shortener, snatch block, and simple sturdy rope couplings.

Each one a time saver and a labour saver, and to which the effectiveness gained by portability and ease of operation must be added.

With the MONKEY GRUBBER a day's work can be done in an hour.

It will surely be to your advantage to know about it from

THE JACK PEOPLE

TREWHELLA BROS. Pty. Ltd.

TRENTHAM, VIC.

W.A. Stockists: HARRIS SCARFE & SANDOVERS LTD.
McLEAN BROS. & RIGG LTD. WESTRALIAN FARMERS LTD.
THE BAIRDS CO. LTD.

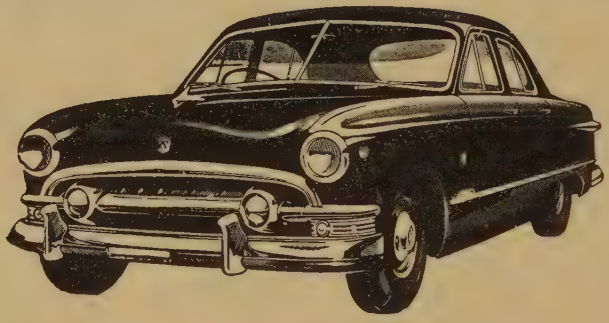
The Wyndham Meatworks with the West Bastion in the background.
—Photo J. A. Mallett.

Other experiments conducted in South Africa showed that although cows living on phosphorus-deficient pastures may live and breed to a great age, they do not calve every year. Over a three-year period, about two-thirds of the cows receiving the phosphorus supplement produced a calf each year but none of the control cows on normal pasture had a calf every year.

The experiment suggested that, during the first year, the control cows which were in good condition had sufficient mineral reserves in their bodies to produce a normal calf drop. During the second year the drain on phosphorus through the milk supply to the calves was so great that the majority of the cows were unable to breed and missed a year. During the third year some of the control cows had built up their mineral reserves to the minimum requirements for breeding and bore calves in that year.

In order to give the calf as good a start in life as possible, Nature compels the cow to draw on her bodily reserves of minerals and these are supplied to the calf through the milk. It is this heavy drain on the system which causes a nursing cow to develop "creeps".

Even then, the calf is not always supplied with adequate minerals for although the quality of the milk may not be affected by mineral shortages in the cow's ration, the milk flow will often diminish in quantity to such an extent that it is far below requirements of the calf. Such calves commence life handicapped by malnutrition and, even if they survive the trials of their early years, they are apt to be undeveloped, weak-constitutioned and later in attaining maturity.



FORD OWNERS

Repairs to Your Vehicles

by Ford Trained Mechanics

and

Prompt Replacement Parts Service

are obtainable from

DUNCAN MOTOR CO.

FORD DEALERS

701-703 Wellington Street
and Harbourne Street, Leederville

FOR HEAVY REPAIRS

BA 4919 **BA 5534**

PHOSPHORUS SUPPLEMENTS

There appear to be only two methods by which station cattle can be supplied with mineral supplements—by making prepared licks available or by supplementing the water supply of the cattle by adding whatever minerals are deficient in the pastures.

To supply tens of thousands of cattle in the Kimberleys with prepared licks would obviously not be a practical proposition. The cost of substances such as bonemeal, bone-flour or meatmeal would be too high even if we disregard the heavy transport costs. There are deposits of phosphatic rock on islands off the Kimberley coast which, if ground and made palatable, could possibly be used in the composition of stock licks but I fear that the costs of mining, sea transport, grinding and treatment with salt and molasses, added to road freight charges from the coast to inland leases, plus the distribution cost to troughs scattered over million-acre runs, would make this method far too expensive.

Research work carried out overseas and by our own Animal Nutrition Officer (Dr. L. C. Snook) in the South-West has shown that the surest and most economical methods of overcoming the phosphorus deficiency in cattle are by supplying the supplement as a routine addition to the water supply or the feed. On dairy farms in the South-West, a saturated solution of phosphate is sprinkled over the feed given in the bails but this method could not be applied under range conditions.

In the U.S.A., extensive research work is being carried out into the practicability and the economics of supplying range cattle with mineral supplements and it has been proved that the benefits derived from supplying phosphorus supplements to range cattle were so great that it has now become standard practice on many ranches.

Only last year, a small machine was patented and is now being manufactured commercially in the United States. This machine when fitted to the delivery pipe from the storage tank to the water troughs can be adjusted to automatically deliver any desired quantity of mineral solution to each animal as it drinks.

The North-West Branch of the Department of Agriculture has ordered two of the American machines described above for trial purposes, and arrangements are in hand for demonstration units to commence work during the present season.

Due to its complete solubility and because very strong solutions can be made, monosodium phosphate, which is used in the U.S.A., would undoubtedly be the best phosphatic supplement to use in this country but unfortunately, it is in very short supply here.

The holding yards at Wyndham Meatworks with the race leading up to th killing floor.

—Photo by courtesy of West Australian Newspapers Lt

ative stockmen with pack mules and droving plant at Fossil Downs Station, West Kimberley.

—Photo W. M. Nunn.

cases has dwindled. In most cases even the opening up of new country has only made it possible to maintain existing numbers.

Under the erroneous impression that big herds mean bigger sales without marked increases in working costs, many lease-holders have endeavoured to stock watering-points to the limit with no regard to the subsequent ruin of the surrounding pastures.

Until supply difficulties can be overcome it may be necessary for us to use a "super-juice" solution through these machines. This is the popular name used in the South-West for the clear liquid drawn off after dissolving 5 lb. of superphosphate in a gallon of water. This is the solution used in the South-West for sprinkling on the feed of dairy cattle.

CONTROLLED BREEDING AND WEANING

Controlled breeding and weaning are the basic principles of successful stock-raising, yet few Kimberley stations have been able to put these principles into effect.

Under present conditions most Kimberley cattlemen are branding 20% to 25% and selling about 10% of their herds every year.

Regardless of the areas of new country which have been opened up by the provision of additional watering-points, the percentage of sales in relation to total herd numbers has not materially increased over the years and in many

Complete boundary fencing and subdivision must be included in any long-range plan for the reorganisation of the Kimberley cattle industry, but only three paddocks on each lease would be required for a start to permit the introduction of a system of management embracing: (a) Controlled breeding at the appropriate season; (b) calf weaning at the right time; (c) systematic speying.

It is my belief that with the adoption of such a system, cattle mortalities could be considerably reduced and sales increased by as much as 100% in some cases. Working conditions would be simplified and would prove no more costly than in the past, and a better class of cattle could be produced. The increase in sales in relation to total herd numbers would contribute no small amount towards the reduction of costs.

In a herd of 10,000 cattle it should not be difficult to paddock off 3,000 breeders. These should preferably be selected animals aged from three to six years. Another paddock should be provided for the bulls and as all stations are under stocked with selected bulls, the best use would have to be made of whatever animals were available.

The allocation of bulls to breeders should be governed by the area of the paddock and the class of country where the breeders were running as well as the distribution of water-points in that paddock. Bulls could be put with the breeders about April and returned to their own enclosure in June or early July. By holding the mating season back to April, the first year should give both breeders and bulls a chance to build up any condition and would result in calving taking place during the green feed season. The cows will be growing stronger after the long spell on dry feed and will be able to produce increased quantities of milk to meet the requirements of the calves.

By September when the country is drying up and the cattle are going back in condition, all the calves can be weaned. After being tailed for a few weeks (the fat cattle mustering is about over by then) those weaners will have quietened down and will have learnt many lessons to make them easier to handle when being worked as grown cattle. After branding, at which time they would be stamped with a year number on the cheek, they could all be settled down in a weaner paddock. Where a bullock paddock was available and large enough, the steer weaners could be turned into it.

The following year, all the yearling heifers could be mustered and released in the breeder paddock or if the mustering was started in the mating season, they could be held temporarily in the bull paddock and moved to the breeder paddock later.

All the heifers will then be about 15 months old and as another nine months must pass before the bulls are again with the breeders the heifers will be about two years old before they come into contact with the bulls. Their first calves will be born when they are nearly three years old.

By weaning the calves at the start of the annual drought period the breeders will all be dry cows while on dry feed. There will be no drain on their systems through lactation, and mortalities should be greatly reduced. Such cows would be in good strong condition to mate during the next green feed season.

After the first year, the service season could be changed to the month of May. This would allow the calving season to fall well within the months of the best pasture conditions and all calves would be fit to wean before the grass supplies became seriously depleted.

SYSTEMATIC SPEYING

By establishing this system and supplying mineral supplements one could reasonably expect to get an 80% branding in relation to breeders. This represents 2,400 calves from our 3,000 breeders and according to the law of averages there would be about 1,200 steers and a similar number of heifers. Even allowing exceptionally heavy losses from all

Fossil Downs cattle en route to Derby for shipment.
—Photo W. M. Nunn.

The chain system of dressing in operation at the Wyndham Meatworks. —Photo W. M. Nunn.

quarters, 800 to 1,000 heifers annually would be available for the breeder paddock and consequently an equal number of cull heifers and cows could be speyed each year.

As mentioned earlier, research in South Africa and the U.S.A. has proved that cows on phosphorus-deficient pastures are in most cases irregular breeders although they may live and breed sporadically to a great age. Until such time as the mineral deficiency was remedied, therefore, it would be necessary to adopt a guarded "spey for quality" system—a system based on the calving percentage and the number of yearling heifers available to replace the speyed stock.

After the use of selected bulls for a year or two (at present the "mickies" or scrub bulls sire most of the calves) and when the breeders were graded up by cull speying to a reasonably good standard, a "spey for age" system could be introduced.

If a cow has reared four calves and is then speyed, fattened and sold she has done well enough. If she is kept indefinitely she must die some day no matter what the conditions are. It is far better to put 800 or 1,000 speyed cows through the meatworks each year than to have them die on the run. The same number of cows will still be available to breed from each year by keeping the ages at from three to six or seven years.

A cow speyed at seven years old cannot, of course, be expected to pile on beef like a maiden heifer, but she will be quite good enough for a meatworks or a butcher. Whatever the net return received by the cattleman as a result of realising on the "cull for age" cows it must contribute towards reducing the cost of producing the better quality cattle such as bullocks and speyed heifers. Incidentally, speyed cows will usually hold their condition better through the bad spell than will the bullocks, particularly if they are dehorned and paddocked off.

The cost to the industry of the annual mortality in cows alone must be tremendous and, when cull for age speying is introduced and practised annually, production must increase, cost of production must decrease and the killing season at Broome and Wyndham meatworks will have to be extended to cope with the increased number of cattle available for treatment. Admittedly, getting cattle to either of these meatworks late in the year will be a difficult hurdle, but it should not be an unsurmountable one.

CATTLE-WORKING YARDS

A Compact and Effective Lay-out

By GRANT A. SMITH, Cattle Adviser

THE diagram accompanying this article shows a set of yards with an overall size of 50 yds. x 40 yds. through which about 300 cattle may be worked with a minimum of effort. It will be noted that corners have been eliminated wherever possible, and cattle may be worked right round the outer fences with all gates closing behind them as block gates irrespective of whether they are worked in a clockwise or anti-clockwise direction.

Receiving Yards.—No wings are shown as these will vary according to the location of the yards. If necessary, cattle may be admitted to only one yard by coupling the division gate to one of the outside gates.

Round Yard.—This almost circular yard with a diameter of about 20 ft. may be used for horse-breaking.

Killing Yard.—The gallows and gates can be placed where most convenient.

Branding Pen.—If it should be necessary at any time to get a branded beast out of the pen, the exit gate may be opened inward to form a wing which leaves the beast looking directly through the gate as it gets to its feet.

Crush.—It is surprising how many cattle crushes one sees which are built just too narrow to work elephants through them. Bullocks, cows and weaners are often found half turned or jammed in pairs along such crushes.

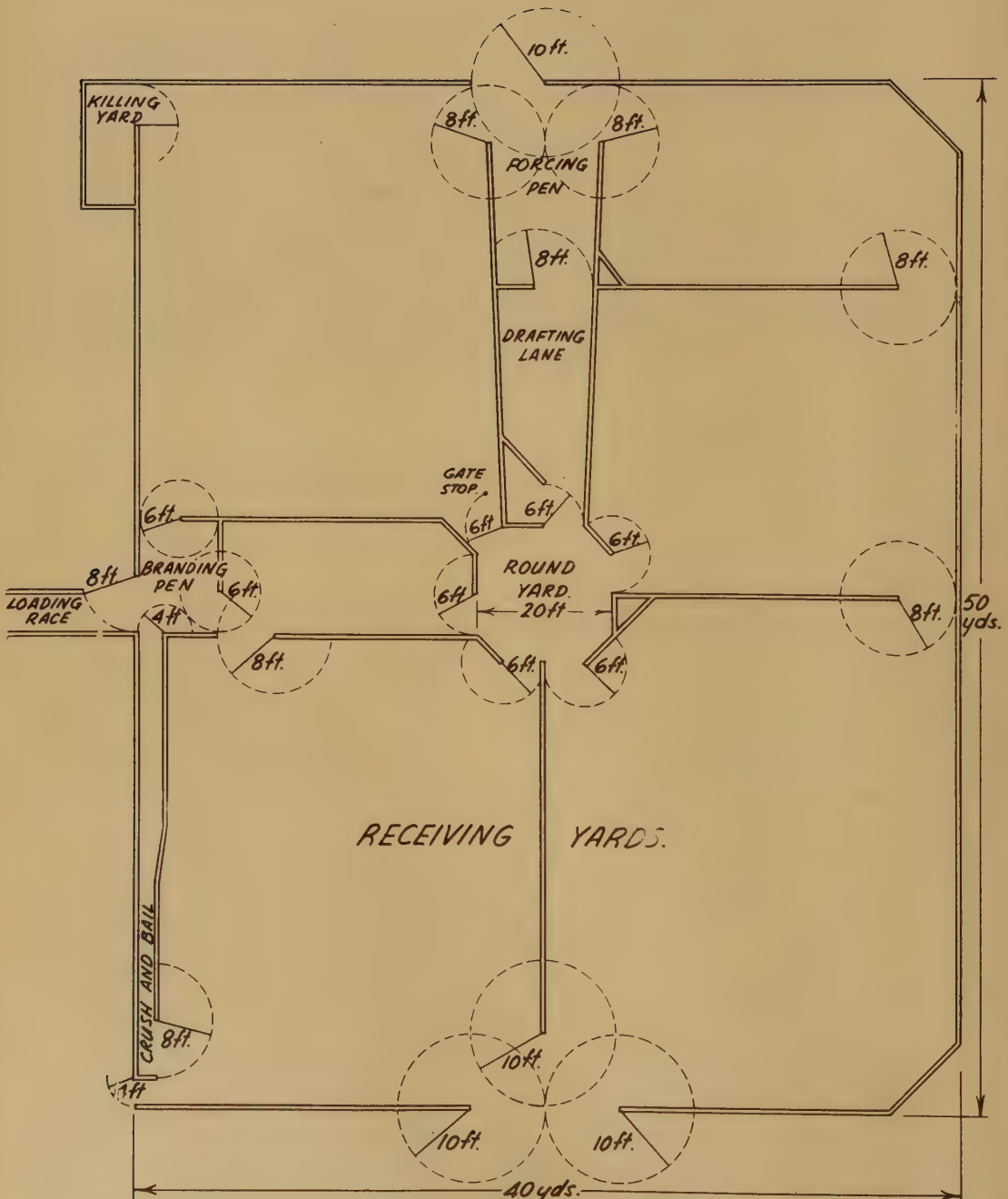
Some cattlemen may consider my idea of a crush too narrow for general work. For cows in calf and well-grown fat bullocks it may be—but how often is it necessary to put these classes of cattle through a crush?

It will be found that bulls and "hornies" can pass through a crush of this size quite safely. There is always a chance of cattle getting their feet over the bottom rail of this or any other crush, but this can be prevented by boarding along the bottom portion. If the crush is boarded completely on both sides, cattle will run much better as they can then see only directly ahead of them.

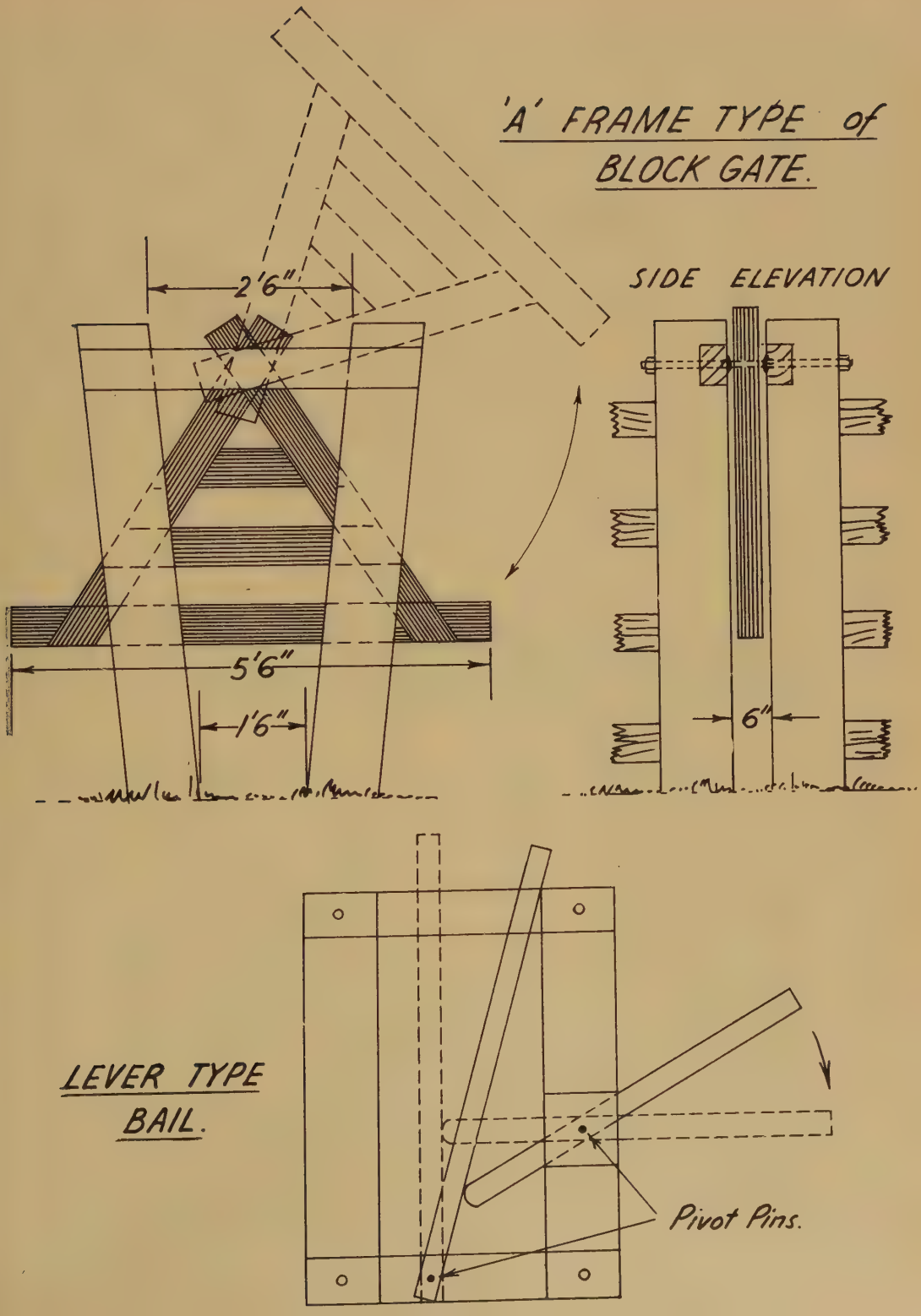
From any point of view, the old A-frame block gate is hard to beat. Any number of these may be fitted between posts at the end of one and the beginning of the next panels. Hung by a single bolt between the caps of two pairs of crush posts, these blocks will be found quicker and easier to operate than any other type I have seen.

They may be swung right out of the crush on either side and held there by letting them rest against a stick laid across the two posts or on a short stick placed upright in the ground. Knock or kick away the stick and the block drops quickly into position and remains a solid bar against cattle moving either backward or forward. Details of the A-frame are given in the accompanying diagrams.

Bail.—The lever-type bail shown in the diagram is quick and easy to operate and 100% secure. The lever is bolted between two posts or pivoted in a mortise in one large post, which is capped on both sides at top and bottom to its corresponding post on the other side of the bail.



SET OF YARDS FOR WORKING CATTLE.


'A' FRAME TYPE of
BLOCK GATE.
SIDE ELEVATION
2'6"
5'6"
1'6"
6"
LEVER TYPE
BAIL.
Pivot Pins.

The bail bar is pivoted on a bolt passing through the two bottom cappings. Extra holes may be bored if necessary to make the bail narrow enough for weaners or wide enough for bulls. When the lever is depressed, the bar shoots across and the beast is securely held as the weight of the lever keeps the bar in position. When the lever is raised, the bail drops back to release the beast and admit the next.

Note the 4 ft. gate swung on the bail post. When this is swung wide open, complete freedom of movement is allowed for dehorning or other tasks.

Gate Stop.—The gate stop on one of the exits from the round yard is advisable if rough cattle are being handled.

FREE SERVICE TO FARMERS

Do you know that the Department of Agriculture provides a free and comprehensive service of advice and technical assistance to farmers.

The Department of Agriculture is at all times ready to assist you with your farming problems and has a number of informative bulletins available covering most phases of agriculture. These are supplied free of charge on application to the Department of Agriculture, St. George's Terrace, Perth.

Specialist officers are at your service at all times, and where necessary they will make personal visits to your property to assist with on-the-spot advice—all without cost to you.

Drop a line to the Department whenever you are in need of advice.

SOLE DISTRIBUTORS, W.A.: COVENTRY MOTOR REPLACEMENTS PTY. LTD.
876 HAY STREET, PERTH

Applying Orchard Fertiliser

A Handy Home-Made Aid

By H. S. ARGYLE, Horticultural Instructor

FERTILISERS such as sulphate of ammonia and nitrate of soda, being rich in nitrogen are used extensively by orchardists and market gardeners. Both these compounds are readily soluble in water and are easily carried through the soil to the rooting areas of plants and trees.

One disadvantage when applying heavy dressings of these manures is the fact that subsequent waterings carry the substances deeper and deeper into the soil so that some of the fertilising elements are apt to be leached away.

In dealing with these soluble fertilisers it is, therefore, advisable to apply a number of fractional dressings spread over the growing period of the plants rather than one or two heavy dressings at long intervals. Such multiple dressings usually entail extra work and time and in many cases orchardists with large areas of ground to cover are unable to adopt the practice.

The diagram accompanying this article illustrates an attachment to the sprinkler irrigation system which can be installed cheaply and enables small dressings of soluble fertilisers to be applied at any time when the sprinkler system is working.

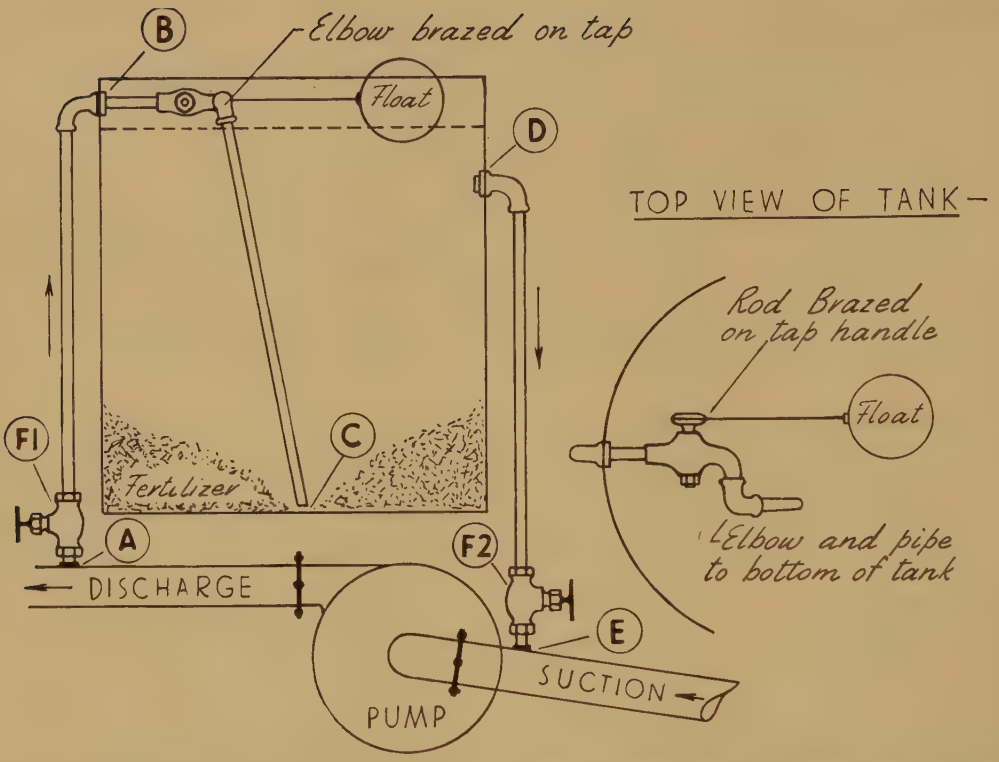
Its installation permits such fertilisers to be applied without waste and with no increase in labour. It will ensure evenness of application, accuracy in the quantities applied and the immediate availability of the fertilisers to the rooting area.

Remember, however, that concentrated solutions could cause damage to foliage, so when applying fertilisers through the sprinkler system do not allow any one application to exceed 25 per cent. of the total annual dressing. As an added safeguard, run the fresh water long enough to wash any fertiliser off the foliage, before moving the sprinklers.

The fittings required include a petrol drum of 20 to 40 gallons capacity; a few short lengths of half or three quarter inch galvanised piping; two galvanised bends to fit the piping used; two stopcocks; one low pressure tap as normally used for galvanised iron tanks and one ball-valve float which may be home made.

It is designed to be fitted to the rotary type of pump and the main delivery pipe from the pump is tapped at (A) from which point water is forced through the piping to a point (B) on the drum which is a few inches from the top and just about the proposed water level of the drum. The galvanised pipe passes through the hole cut in the drum and terminates in a low-pressure tap fitted sideways or, in other words, on a horizontal plane instead of the usual perpendicular position. The stem of the ball-float is brazed to the handle of the tap in such a position that the tap is turned off when the tank is filled. As the level of the water drops, the float falls with it and turns the tap on.

A length of pipe long enough to reach within an inch of the bottom of the centre of the tank is fitted with an elbow and this elbow is brazed on to the delivery spout of the low pressure tap. This length of piping causes the water to be discharged at the point marked (C), and ensures that the water



in the drum is kept in constant motion, thus expediting the dissolving of the fertiliser.

At a point (D) about six inches or more below the water level in the tank, the outlet pipe is fitted and carried to a point (E) on the suction pipe. Naturally the points where the galvanised pipe enters and leaves the tank are brazed or welded to make the joins watertight. Both the delivery and discharge pipes are fitted with stopcocks (F1 and F2) so that the tank may be cut off from the irrigation system when fertilisers are not being applied. The tank should also be fitted with a drainage plug at the bottom so that it may be emptied when not in use.

Following the use of fertilisers in the irrigation plant, it is necessary to thoroughly flush the entire system with fresh water to minimise the danger of corrosion.

To operate the plant first start the pump and fill the tank by opening the stopcock (F1). Measure the desired quantity of fertiliser to be applied to the area to be watered, and place it in the drum before turning on the second stopcock (F2).

BLOCK LETTERS, PLEASE

Long years of copy-reading have made the editorial staff reasonably skilful in deciphering bad handwriting, but we still have letters with unreadable signatures, carrying requests to be put on the mailing list. Block letters please for names and addresses, if you wish to be sure of getting on the list.

CONTROL OF SWARMING

By R. S. COLEMAN, Government Apiculturist

IT has often been said that the secret of getting a high yield of honey is to have a large field force of young bees in every hive at the beginning of the nectar flow. The colonies should not have to build up numerical strength when they should be collecting nectar.

It is just as important for the apiarist to have a large proportion of field bees compared with hive bees as it is to have well-bred queens, efficient equipment and all the other factors which make for success in beekeeping.

The drag on production caused by a large number of hive bees is regarded as so important by apiarists in other countries that some actually cage the queen during nectar flows so that the nurse bees are released for duty as nectar gatherers.

Because of extended flows and the policy of migratory beekeeping, such a practice is not suited to Australian conditions and we have concentrated on breeding longer-living bees from young prolific queens.

This gives rise to full hives and brings an attendant problem—that of swarming—a tendency which is accentuated by a large and varied supply of pollen in the spring. This abundance of balanced protein from the early European fruit trees and the sandplain flora allows the queen to lay to the limit of her powers and the maximum ability of the hive to care for the larvae.

An overcrowded hive is liable to swarm and the building of swarm queen-cells will indicate the imminence of the act.

The most primitive method of controlling the swarming tendency is to cut out the queen cells, but it has little to recommend it. Apart from the fact that a cell is often missed, there are occasions when the bees will swarm and leave no queen-cells to take the place of the absconding queen.

THE DEMAREE METHOD

The Demaree method of preventing swarming is very popular and has much to recommend it. In this method, the brood chamber is raised above a queen excluder, the queen being left with one frame of brood in a box of empty dry combs.

Above this is a super filled with honey, next is the queen excluder, the whole topped by the super filled with brood

in which the young nurse bees are raising queen cells due to the superseding instinct. These queen cells must be broken down between eight and ten days after the change of storeys has been made.

By using the Demaree method, the queen is left with ample laying space and the strength of the colony is maintained. Swarming is discouraged, but no special effort is made to increase the field force ready to go into action at the beginning of the nectar flow.

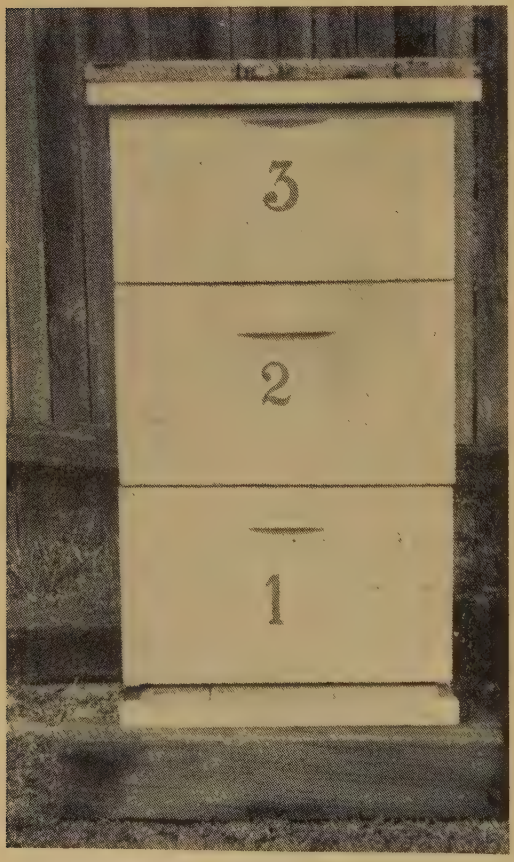


Fig. 1.—Before applying the Demaree method. The supers are numbered for easy reference. At this stage, No. 1 contains brood, No. 2 contains honey, and No. 3 is a super just added containing empty dry combs.

ARTIFICIAL SWARMING

The "artificial swarming" method involves more labour but swarming is definitely controlled, the number of hives is increased if desired and a large field force is reared in readiness for the flow.

In this method, the brood chamber and bees are removed to another site within the apiary, the queen being left with only the frame of brood she is found on. The rest of the box is filled with dry empty comb.

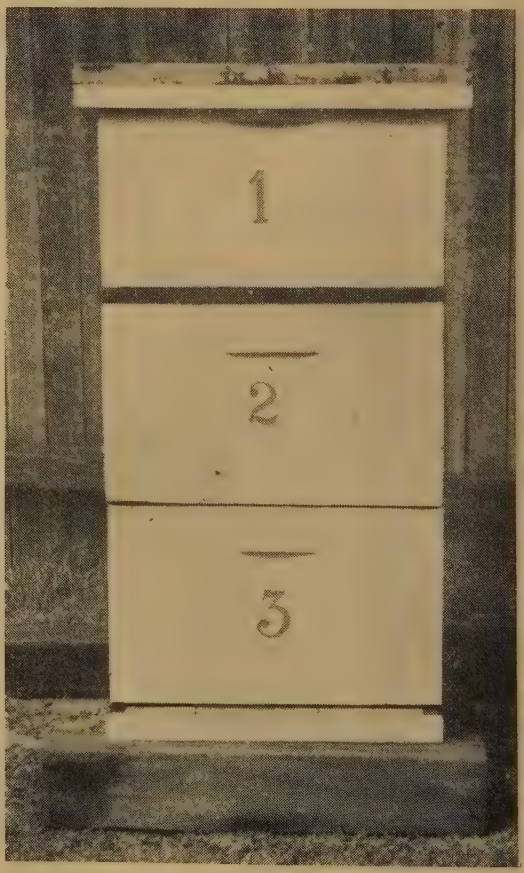
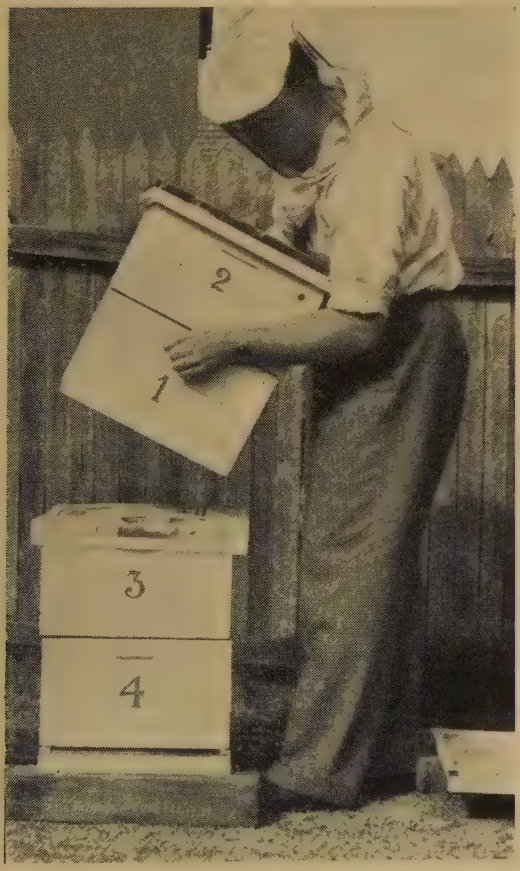


Fig. 2.—Demaree method in operation. The queen is left in No. 3, now the bottom super, with one frame of brood and the balance of the frames, dry and empty. Above this is the super filled with honey and this has a queen excluder between it and No. 1 super containing brood.

Fig. 3.—The first stage in artificial swarming. Supers No. 1 and No. 2 containing brood and honey, are removed from the original site but the queen is left on the original site with super No. 4 containing a frame of brood and a number of empty combs, with a few frames of honey in super No. 3. The flying bees will mostly find their way back to the queen.



Most of the flying bees will find their way back to the queen, leaving the brood and the young nurse bees on the new site—in an ideal situation for introducing a queen cell or even a virgin queen. The next day, or at some time within the first week, break down all the queen cells already started and introduce a cell or a queen bee raised from the best available stock.

So we will have two hives. One is headed by the old queen with oldish bees and very little brood—just as if we had hived a swarm. The other will be filled with young bees, brood and queen cell—just as if a heavy swarm had left. Our "swarming" has, in effect, taken place but without loss of bees. It took place too at a time convenient to

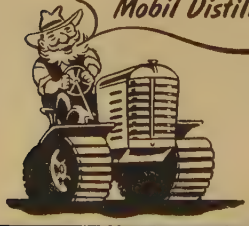
Fig. 4.—At a suitable time, the two colonies may be united. A sheet of newspaper is placed over No. 3 super and Nos. 1 and 2 are placed on top.

More time for Courtin'.
Since I switched to –

Mobil

POWER KEROSENE

–and I get great results from my Diesel Tractor with Mobil Distillate



In fact, more time for everything because Mobil Power gives a quicker switch over from starting (saves idling time); greater power without knocks (more acreage in a given time); therefore, you save money as well as time. Change to Mobil Power Kerosene—NOW

VACUUM QUALITY PRODUCT

MP–512

VACUUM OIL COMPANY PTY. LTD. (INC. IN AUST.)

the beekeeper, and the queen in the new hive is from a first-class strain, while neither of the hives will be likely to swarm again that season.

When the flow is ready to start, the two hives should be united again, preferably by spreading a sheet of paper with a few pin-holes in it over the old hive and placing the new one on top. The bees tear away the paper in due course and the two colonies unite peacefully.

The poorer queen can be killed off before uniting the hives, giving a strong colony headed by a young prolific queen. Such a hive should store the maximum quantity of honey from any nectar flows.

FOR MINERAL MIXTURES AND LICKS

Tri-Cal-Os

Sterilised

BONE FLOUR

To Remedy

Phosphorus Deficiency

in Pastures and Fodders

TRI-CAL-OS BONE FLOUR contains a guaranteed minimum of 65 per cent. tricalcic phosphate, 30 per cent. phosphoric acid and 40 per cent. lime.

All particulars from

Davis Gelatine, c/o Jack Dyson
G.P.O. Box 588, Perth

A HOSPITAL PADDOCK

Wherever many head of stock are kept on a farm there are two things that will always pay very handsome dividends—a loose box and a small hospital paddock.

For big stock such as horses and cows a fair sized loose-box is really a necessity. A place about 10 or 12 feet square sited so that it faces north and gets plenty of sunshine throughout the greatest portion of the day is marvellously handy whenever one of the animals is off colour. It should be well protected on the weather side so that the sick animal is sheltered from the cold winter winds, for a sick animal left without adequate protection is liable to become a great deal worse on a winter night when its natural resistance is further lowered by cold weather. Then too, the farmer can give the animal better attention when it is housed under cover not far from the house. The loose-box need not be an elaborate affair. Even a well-constructed bush shed with a straw roof thick enough to keep out the rain can be a very snug spot for an ailing animal.

A small hospital paddock near the homestead can be a paying investment too that will be very handy during the blowfly season. All the flystruck sheep can be drafted into it and they are right there under your eye for inspection and dressing. The fact that the struck sheep are out of the flock will often reduce the likelihood of further strikes because such sheep attract more flies. When one has to yard the whole flock to handle a few sick sheep the average man is liable to put the job off until tomorrow—and tomorrow is apt to be next week. Footrot and other ailments and injuries will nearly always ensure that there are one or two sheep in the hospital paddock, and it will effect a surprising reduction in the casualty list. Where possible your little hospital paddock should contain, or adjoin a shade and shelter clump to give adequate protection from wind and sun.

Ex-Orchardist, T. (Chance-it) Buck
He left an awful lot to luck.

Come spraying time T.B'd relax
And write his losses off to tax.
But T.B. left too much to chance
And overdrew his last advance.

MORAL: *Don't take chances with insect pests. Spray thoroughly with "PESPRUF" 50—an effective insect spray for* ***FRUIT, VINES*** *and* ***VEGETABLES.***

- **easily mixed**
- **ready for use**
- **compatible with all other sprays**

'PESPRUF' 50

D.D.T. DISPERSIBLE POWDER

W. Aust. Distributors: **WESTRALIAN FARMERS' CO-OP. LTD.**

PES.3.W.2700

A DEPENDABLE PLANT ICI PROTECTION PRODUCT

IMPERIAL CHEMICAL INDUSTRIES OF AUSTRALIA & NEW ZEALAND LIMITED

CITRUS-GROWING IN WESTERN AUSTRALIA

The 1952 Crop Reviewed

By H. R. POWELL, B.Sc. Agric., Superintendent of Horticulture

WESTERN Australia in a normal year produces approximately 500,000 bushels of citrus fruits comprising 70% oranges, 20% lemons and the remainder made up mainly of grapefruit and mandarins. A general decline in production has occurred over the past three years due largely to the unfavourable seasons which have been experienced. In 1949 just over 500,000 bushels were produced. The 1950 figure was below 450,000 bushels while in 1951 approximately 375,000 bushels of citrus fruits were harvested.

The reduced production is reflected only in part by the quantity of citrus fruits which are shipped overseas. In 1949, 48,000 bushels were exported, but although in 1950 this figure had fallen to 21,000 bushels, a recovery was made in 1951 when the export figure was almost 43,000 bushels. Although the size of the crop has a bearing on the amount of fruit available for export, the quantity exported is a relatively small proportion of the total crop and, therefore, is not influenced to the extent that might be expected by seasonal variations in production. Trade factors largely determine the volume of exports.

In contrast to the very heavy blossoming which occurred in the spring of 1950 most citrus trees and especially the oranges, produced a poor showing of blossom in the 1951 spring. Washington Navels, in particular, showed little promise of producing a satisfactory crop. Many trees produced practically no blossom at all and this in some instances was related to the severe frosts experienced during the late winter months. Frost damage also occurred to lemons in colder districts.

Observations since that time have substantiated the original expectations of light crops in all varieties; the total production is not anticipated to be more than two thirds of the last season's crop. The estimated figure is 250,000 bushels. Apart from factors contributing to the poor blossoming, growing conditions have not been good. High summer temperatures and strong, dry, easterly winds coupled with insufficient summer moisture have limited the growth of the fruit, resulting in the present fruit sizes being below normal.

The estimated production figures for the main citrus fruits are as follows:—

Navel Oranges	65,000 bushels
Valencia Oranges	100,000 bushels
Lemons	60,000 bushels
Grapefruit	15,000 bushels
Mandarins	10,000 bushels
	250,000 bushels

"METHOXONE" LIQUID HORMONE WEED KILLER

Don't let WEEDS pinch YOUR PROFITS..

YIELDS DOUBLED

Wheatgrowers report that treated sections have yielded 11 bushels after treatment with "Methoxone" and that untreated sections of the same crop barely yielded 5 bushels.

WILD TURNIP WIPED

One spraying thoroughly wipes out Wild Turnip and Wild Radish.

ECONOMICAL

The cost of "Methoxone" to destroy Wild Radish or Wild Turnip is less than 5s. an acre.

SAFE

"Methoxone" is the safest weed killer for cereal crops, especially at recommended rates. It is non-poisonous, non-inflammable, non-corrosive and will not cause soil sterility.

Cost of "Methoxone" is wholly deductible for income tax purposes.

ICI

"METHOXONE"

LIQUID HORMONE WEED KILLER

Order your Supplies or Equipment NOW from the West Australian Distributors:

ELDER, SMITH & CO. LIMITED

ST. GEORGE'S TERRACE :: :: :: PERTH

WESTRALIAN FARMERS' CO-OP. LTD., 569 Wellington Street, Perth

Actinomycosis and *Actinobacillosis*

By J. SHILKIN, B.V.Sc., H.D.A., Senior Veterinary Surgeon.

ACTINOMYCOSIS and actinobacillosis, commonly known as "lumpy jaw" and "wooden tongue" respectively, are chronic infective diseases which are most commonly encountered in cattle, occasionally in pigs, and much less frequently in the other domestic animals and man. They are characterised by the presence of tumour-like swellings and exude pus containing yellow sulphur-like granules. These swellings are commonly found in or on the jawbones and tongue, but may be found on occasions, in other parts of the body such as the lungs, liver, spleen, etc.

For a number of years it was generally believed that the particular type of fungus (Actinomyces bovis), commonly referred to as the "ray fungus" from its manner of growth, was the causative organism of actinomycosis or "lumpy jaw," but it has since been determined that this organism plays little or no part in the disease. It is now considered that several forms of bacteria produce the condition chiefly one known as Actinomyces, or Streptothrix israeli. Bacillus pyogenes may also produce a somewhat similar condition in the jaw.

Actinobacillosis or "wooden tongue" is generally caused by an organism known as Actinobacillus lignieresi while a similar condition which sometimes occurs in the udders of cows, is almost solely caused by the organism known as Staphylococci pyogenes aureus.

METHOD OF INFECTION

The method of infection is not fully understood. The fungus previously regarded as causative is found on the soil and grass, and it was considered that it gained entry on grass seeds such as barley grass. Since it has been found, however, that this fungus is non-pathogenic, and that infection is due to other bacteria, ideas regarding methods of infection have had to be revised. It is now considered that the organisms responsible may commonly be present in the upper air passages and intestines, and that when conditions are favourable, such as through loosening of teeth, or laceration of gums, cheeks, mucous membranes of the bowel walls etc., they gain entry to the tissues and become established.

Fig. 1.—A typical case of "Lumpy jaw."

WHAT TO DO

in your orchard . . .

CITRUS
Red and Brown Olive Scale—Use Neptune White Spraying Oil.

DECIDUOUS
Red Spider, Mites and Scales—Use Neptune Palsol or Red Spraying Oil.

ENSURE DORMANT CONTROL OF PESTS . . .
by ordering now your requirements of the following Neptune Sprays:—
APHIDOL PALSOL LIME SULPHUR
PREPARED RED SPRAYING OIL

Brown Olive Scale. (Enlarged)

NEPTUNE

SPRAYING OILS

Order Neptune Sprays From Your Local Neptune Agent

NEPTUNE OIL CO. PTY. LTD. (Incorporated in N.S.W.)
OLDEST ESTABLISHED MANUFACTURERS AND MARKETERS OF SPRAYING OILS IN AUSTRALIA

SYMPTOMS

The commonest lesion of actinomycosis is found in the bones of the jaw, either upper or lower. The spongy tissue of the bones is replaced by tumour-like formations consisting largely of connective tissue. Pus is formed in the pockets of the diseased tissue and in appearance it is granular, thick and yellow, greyish-yellow or greenish-yellow in colour. The framework of the bone is partially softened and the growth of inflammatory tissue separates the outer layers of the bone from each other, so that the bone appears distended.

In the early stages the swelling is hardly perceptible, but with the progress of the disease, large swellings may develop with masses of affected tissue appearing through the skin or along the gums. At the same time adjacent tissues such as the submaxillary or parotid lymph glands or the tissues of the throat may be involved, and the resultant swelling may interfere with respiration.

Whilst the swelling is small there is usually little interference with the health of the animal. Later, however, the swelling may make eating difficult or almost impossible, and swelling in the throat region may so interfere with respiration as to cause the animal considerable distress. At this stage there is marked loss of condition, increasing weakness, followed by death.

The commonest lesions of actinobacillosis are in the tongue or surrounding tissues in the mouth or throat. In the tongue the earliest evidence of the disease is usually found in the top of the organ just in front of the ridge. It is here that penetrating grass seeds from the feed are most likely to become lodged, enabling the causative organisms to gain entrance. A greyish-yellow ulcer may first develop at this site on the surface, or deep seated abscesses, which are not visible, may develop in the tissues of the tongue itself.

As the disease progresses the tongue becomes increasingly stiff and sore, the entire muscle of the organ being infiltrated with fibrous tissue and small abscesses ranging from the size of millet seeds to that of small walnuts. Eating becomes difficult, and the tongue protrudes from the mouth.

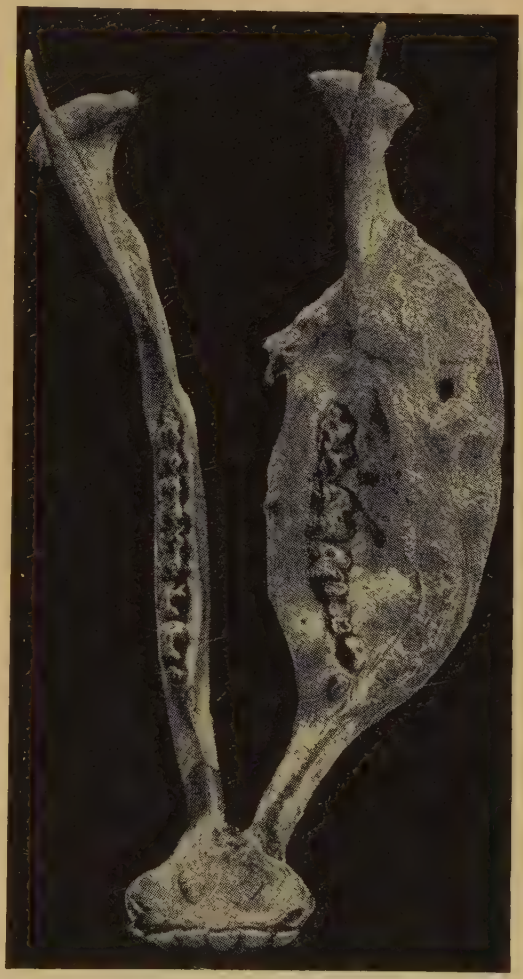


Fig. 2.—Skeleton of the lower jaw of a bullock suffering from actinomycosis, showing how the growth of inflammatory tissue separates the layers of bone from each other and distends the jawbone.

DIFFERENTIAL DIAGNOSIS

It is possible to confuse actinomycosis with grass seed abscess and tuberculosis of the head and throat. However,

grass seed abscesses have a rapid development and cause considerable pain due to the acute inflammatory reaction, whereas both actinomycosis and tuberculosis are slow-developing conditions with little or no pain being apparent. Where the abscess resulting from grass seed penetration has become chronic there may be considerable difficulty in differentiating the condition. Tuberculosis can be differentiated from both conditions by means of the tuberculin test. In the case of both actinomycosis and T.B., where the abscess or abscesses have broken the outside skin and are discharging, healing does not take place. An occasional abscess may close up temporarily only to open again in a variable period. Grass seed abscesses, once open and draining well, will usually clear up even without treatment.

TREATMENT OF ACTINOMYCOSIS

Actinomycosis may be treated under some circumstances by surgical means involving removal of the growth. In the majority of cases, however, the disease would be too far advanced for surgery by the time the condition was observed.

For many years iodine preparations have been used both by mouth and by intravenous injection, but results with actinomycosis have been rather disappointing, and most cases of the disease eventually find their way to the butcher.

Recent experimental work with some of the newer antibiotics, particularly streptomycin, have been encouraging, and it is possible that early treatment with some of them will save many affected animals.

TREATMENT OF ACTINOBACILLOSIS

Treatment of actinobacillosis with iodine preparations has given better results than those experienced with actinomycosis. Potassium iodide is given in the drinking water in doses of 1/6 to 1/3 ounce daily for adult cattle. This is continued for from 2 to 4 weeks, but watch must be kept for symptoms of iodism or iodine poisoning. These include nasal and eye discharges, skin eruptions, falling of the hair and loss of condition. If any of these symptoms be noticed, the iodine administration should be discontinued for six or seven days and then recommenced.

Intravenous administration of sodium iodide is more effective than the administration of potassium iodide by the mouth, but should preferably be administered by a veterinary surgeon. One injection will frequently result in a complete cure in a matter of weeks.

The organism is only slightly sensitive to penicillin, but the sulphonamide drugs, particularly sulphapyridine, sulphamezathine, and sulphathiazole, appear to have a marked effect against it, and it is possible that further work will indicate a satisfactory farm treatment using one of these drugs.

CAPE TULIP CONTROL

STRONG measures will be taken this season to control the spread of Cape Tulip in Western Australia.

There is ample evidence to show that the spread of Cape Tulip has been due, to no small extent, to the movement of infested farm produce particularly hay and chaff. The movement of any declared noxious weed from one district to another is a contravention of the Noxious Weeds Act and a ban will be placed on the movement of hay or chaff containing seeds or corms of Cape Tulip.

In districts where the weed is firmly established over large areas, a degree of control is the most that can be expected in the immediate future and the immediate programme will be directed against preventing distribution from these areas. In other localities where only small patches of the weed exist, eradication is possible and efforts will be made to this end.

VIBRIOSIS *(Vibrio Foetus Infection)* RECORDED IN SOUTH-WEST HERDS

By J. CRAIG, M.R.C.V.S., Senior Veterinary Surgeon

VIBRIOSIS of dairy cattle was recently diagnosed for the first time in several herds in the South-West part of this State. This disease is not a new one, since Vibrionic abortion has been recognised for some considerable time in Europe and America, while within recent years it has been identified as causing abortion and sterility in cattle in the Eastern States of Australia.

Vibrio foetus infection is caused by small comma-shaped and spiral-shaped organisms, which invade the genital tract of cattle, and may be characterised by sporadic abortions and temporary sterility or delayed conception among the members of the dairy herd.

SOURCE OF INFECTION

The appearance of Vibrio disease in a herd may be traced to an introduced infected animal. As far as is known the infection may be transmitted during service, and an infected bull can infect each animal with which it is mated. Infection can also take place by means of contact with infected material voided from a recently aborted animal, the organisms gaining entrance to the animal body through the digestive tract or the mucous membranes of the mouth or eye.

SYMPTOMS

Commonly there is a history of continued and often irregular return to service, cows and heifers returning to the bull at from one to nine weeks. Other early symptoms may include a transient vaginitis, with a copious clear mucoid discharge visible a few hours after service, or a muco-purulent discharge up to 48 hours following service.

Abortion or early foetal death may occur, with the result that animals thought to be in calf may return to the bull at any time after service until six months in pregnancy. An abortion from four to six months is usually detected by the farmer from outward visible symptoms, i.e., increase in udder size, swelling of the vulva, remnants of foetal membranes (afterbirth) still visible, or the recovery of the foetus. Prior to four months the small foetus is usually aborted complete with foetal membranes and may not be detected. The only evidence of the abortion in such a case is that the animal returns to service.

COURSE OF THE DISEASE

In the acute stage of Vibriosis, continued and usually irregular return to the bull is the only evidence of its presence in the herd. As the disease becomes established in the herd, abortions at four to six months may occur.

Where the infection has been present in the herd for some time, the disease mainly reveals itself in the younger members (first or second calvers) or in newly-introduced animals; the older members of the herd, having acquired a tolerance to the disease, will often hold to the bull and bear full time viable calves.

Abortions met with are in the region of 4% only, but several infected members of the herd may remain permanently sterile.

DIAGNOSIS

In herds where Strain 19 vaccine has not been used, Vibriosis may be confused with Brucellosis (Contagious Abortion). Generally speaking, however, with Vibriosis abortions occur in the first six months of pregnancy, and with Brucellosis from the fifth to seventh month, or the birth of a full term dead calf.

In any case, Brucellosis may be detected by blood examination (agglutination test). With Vibriosis the abortion rate is not high, rarely more than 10%, and with an average of 4.5%. The first indication of infection may be the repeated returning to service by cows and heifers and signs of irregular oestrus (heat), while a muco-purulent discharge may be visible following service.

A certain diagnosis can only be made in the laboratory where microscopic examination of the aborted foetus will reveal the causative organism, Vibrio foetus, in large numbers in the foetal stomach contents.

TREATMENT

Both penicillin and streptomycin have been used in Vibrio infected herds, but the most effective method of treatment would appear to be the streptomycin. Infected females are given an intra-uterine injection of 1 gram of streptomycin in 2-3 fluid ounces of distilled water, and put to the bull at the next heat period.

Bulls may be treated by intramuscular injection with a dose of 4-6 grams streptomycin per day for four consecutive days, according to body weight.

Treated cows have been shown to hold after one or two services compared with three to seven services in the untreated animal, whilst bulls may be used 24 hours after the last injection.

CONTROL

The measures to be adopted will depend on the extent of the infection, and on the economic value of the herd members, and in all cases aborting cows should be isolated and maintained in such isolation until genital discharges cease.

With a widespread infection shown by early abortions and breeding troubles over several seasons, it is probable that the infection is well distributed among the individual adult members of the herd. In such cases, a tolerance to Vibriosis will probably develop and the cows will hold satisfactorily to service. Heifers, however, must be mated with a clean young bull and this animal must not be permitted to serve older cows. In this way a clean herd may be built up; this self-limiting phase of the disease is not as yet fully understood.

Individual herd members may be treated as indicated, this being especially applicable where valuable animals or stud stock are concerned, while in small herds it may be economical to cull infected cattle in an endeavour to eliminate the infection.

CONCLUSION

With the identification of Vibrio foetus in Western Australia, yet one further cause of abortion, temporary sterily, and failure to reproduce has come to light. However, the problem of bovine sterility is a complex one, and many factors may be incriminated. There are many other causes, based on faulty or inadequate nutrition, hormonal imbalance, ovarian disease, and specific or non-specific infections of the genital tract.

Vibriosis of dairy cattle would not appear to be as serious a menace to the dairying industry as Brucellosis, but nevertheless it is of some considerable economic importance in view of its disruptive influence on the breeding efficiency of a herd. The present knowledge of the disease is incomplete, and further research is necessary to produce more efficient and rapid aids to diagnosis.

FARM FENCING HINTS

1—STRAINER POSTS AND FENCE PATTERNS

By J. A. MALLETT ("Martingale")

GOOD fences have long been regarded as the sign-manual of the good farmer. A taut, well-constructed and well-maintained fence does more than merely add to the appearance—and cash value—of a farming property; it makes a priceless contribution towards the owner's peace of mind. He knows that his stock will "stay put" instead of disporting themselves in his own or his neighbours' crops—and the fence which keeps his own animals in will keep straying stock out, and so save both time and temper.

In these difficult days, the ingredients of a good fence are hard to come by. Posts, netting, wire, etc., are in short supply and even those who are fortunate enough to obtain these "raw materials" find it difficult to engage skilled labour for the erection of the fence.

I well recall the time when every rural district had its quota of tough old-timers who specialised in fencing contracts—putting up miles of excellent fences in real tradesmanlike fashion at a price which seems ridiculously low today. And they were real fences, built to last, for those old hands took a tremendous pride in their work.

Fencing contractors of that calibre are scarce in these days, however, and these notes are designed to assist the man who has to tackle the job with little or no practical knowledge to aid him.

SETTING OUT THE FENCE-LINE

Preparing the fence-line is the first operation. If it is a boundary fence, there will be survey pegs to serve as a guide. The line should be thoroughly cleared, if it runs through virgin bush, for at least six feet on either side of the fence, and any trees likely to fall across the fence in future years should be felled.

If the type of country, condition of the finances, and the "good neighbour policy" permit, it is a sound idea to clear the line sufficiently to permit the ploughing of a firebreak on each side of the fence, for good fences are too costly to expose to unnecessary fire risks.

The actual line on which the fence will stand should be well defined by sight-stakes planted at convenient intervals. Cut a number of straight sticks about five feet in length. Sharpen one end and tie a sheet of white paper around the other end to aid visibility.

KILL WEEDS

the modern way . . . .

with

DAVID GRAYS

AERIAL SPRAYING Service!

FARMERS! **Increase your Cereal Crop yields by killing weeds the MODERN way . . . . namely, AERIAL SPRAYING; introduced to Western Australia by David Gray and Company. Unlike the usual "Boom" spraying method which causes a certain amount of crop damage—there is no LOSS with aerial spraying, it does the job QUICKER, it does it BETTER, and at FRACTIONAL COST!**

Orders for David Grays Aerial Fleet are pouring in . . . . lose no time in booking YOUR seasonal spraying requirements. Write, ring or call personally for further information about David Grays Modern Aerial Spraying Service

USE DAVID GRAYS PROVED WEEDICIDES

Firstly . . . . The Amine Salt of 2,4-D, which eradicates Wild Radish, Wild Turnip, Double Gee, Cape Tulip, Capeweed, Dandelion, etc. Then for weeds that are resistant to 2,4-D, you should use David Grays Hormone Weedkiller, The Ester of 2,4,5-T, this is invaluable when dealing with Blackberry, Lantana, Sweet Briar, etc.

DAVID GRAY & CO. LTD—10 Railway Pde—West Perth

Plant two stakes on known survey marks then stand well back and sight along them. An assistant holding another stake at arm's length in front of him moves backward or forward in response to hand signals until his stake is exactly in line with the other two. An arm raised above the head gives him the signal to drive in his stake and with three stakes planted it is a simple matter to continue the line.

If the fence is to carry rabbit netting which is trenched six inches, it is a good idea to plough a deep furrow at this stage to save a lot of spade work later. Re-set your sight-stakes immediately after ploughing, and check their accuracy by re-aligning them from both directions, and you will be ready to put in the strainer posts.

SUITABLE FENCING TIMBERS

Jamwood *(Acacia acuminata)* is probably the best of all fence-post timbers. It gets its name from its characteristic odour which resembles that of raspberry jam. It is highly resistant to attacks by termites and wood-rotting fungi and is exceedingly tough and durable. Jamwood fences in many wheatbelt districts are still sound 60 years after erection.

Boree or ti-tree *(Melaleuca species)* is another popular wheatbelt timber. It is termite-resistant but tends to become very brittle with age. Some of the native pines *(Callitris species)* are also termite-resistant but are susceptible to rots and soon deteriorate.

Split whitegum or wandoo *(Eucalyptus redunca)* gives good service as posts in some localities, while split jarrah *(E. marginata)* is very widely used over a large part of the State and rivals jamwood in its durability and resistance to termites and fungi. The sapwood should be avoided however and the use of small round posts is not advisable.

Steel fencing standards, especially those of the Y or star section, are very popular. They may be purchased with holes punched for fencing wires at desired intervals and can be driven in without preliminary post-hole sinking, thus effecting a considerable saving in time and labour. They are fire and termite proof—but the purchase cost is liable to be heavy and supplies are short. Angle-steel and flat steel standards are cheaper and have their uses as intermediate posts but are not as strong as the star or Y posts.

STRAINER POSTS

Jamwood, jarrah and wandoo, in that order, are the best timbers for strainer posts. Reinforced concrete strainer posts are becoming popular in areas where no suitable heavy timbers are available.

As the strainers are the main posts in the fence they should be sunk well into the ground and securely braced to withstand a considerable strain. For this reason they should be as thick as can conveniently be handled so that they bear against a large area of soil surface. A good length for a strainer post is seven feet with three feet in the ground, but an extra six inches of depth can be allowed for corner-posts and gate-posts.

An ordinary spade, a long-handled post-hole shovel and a good crowbar will be needed to sink the holes.

Choose a heavy crowbar with a chisel point at one end that is 2½ to 3 inches wide. The extra effort needed to lift a heavy bar will be offset by the good penetration which its weight will achieve on the downward stroke. A light bar has to be lifted higher and needs muscular effort to aid its downward thrust into hard subsoil. The beginner usually raises a crop of blisters and jars his wrists by gripping the bar too tightly on the down-stroke, but the old hand holds the bar loosely and lets its weight do most of the work.

Put the strainer post hole down at least three feet and try to keep the sides perpendicular and the diameter of the hole not much greater than that of the post.

BRACING THE POSTS

There are dozens of different methods of bracing strainer posts but if some fairly flat rocks are available I like to ram one such rock down into the bottom of the hole on the side opposite to where the strain will come. It is an advantage to cut away the post to give flattened surfaces to bear on the rocks.

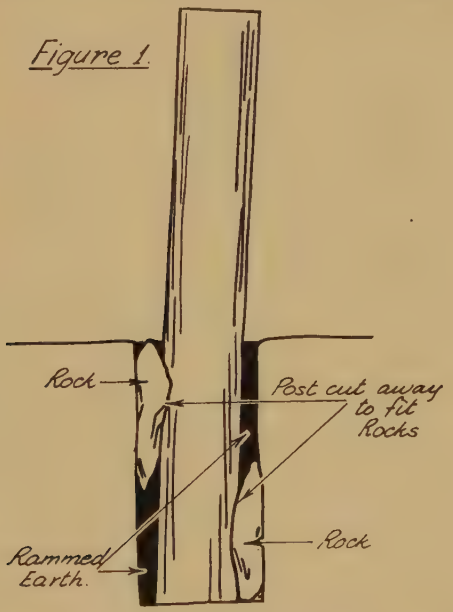


Fig. 1.—Strainer post braced with rocks. Note slight lean away from direction of strain which will be rectified as the wires are tightened.

Soil is then thoroughly rammed into the hole until it is about half-filled, then another rock is placed at ground level on the opposite side of the post (Fig. 1) before completing the filling and ramming of the hole. This results in the post assuming a slight lean away from the direction of the strain, but as the wires are strained up it will be pulled to a perpendicular position. When this occurs the soil round the posts should be rammed again.

If no rocks are available, slabs of timber, old plough-discs or large pieces of scrap metal will serve the same purpose.

Angle Struts.—For corner posts and gate-posts, timber struts are usually added to give extra bracing. The common angle strut is a stout piece of timber with its top end resting in a scarfe or mortise cut in the strainer post and its bottom end braced against a solid stop such as the first ordinary post of the fence or a stake or large stone firmly planted in the ground (Fig. 2).

Angle struts should be not less than 10 feet long, should be at least six inches in diameter and should be kept low down on the strainer post. Short struts, or those placed too high on the strainer, tend to pull the post out of the ground.

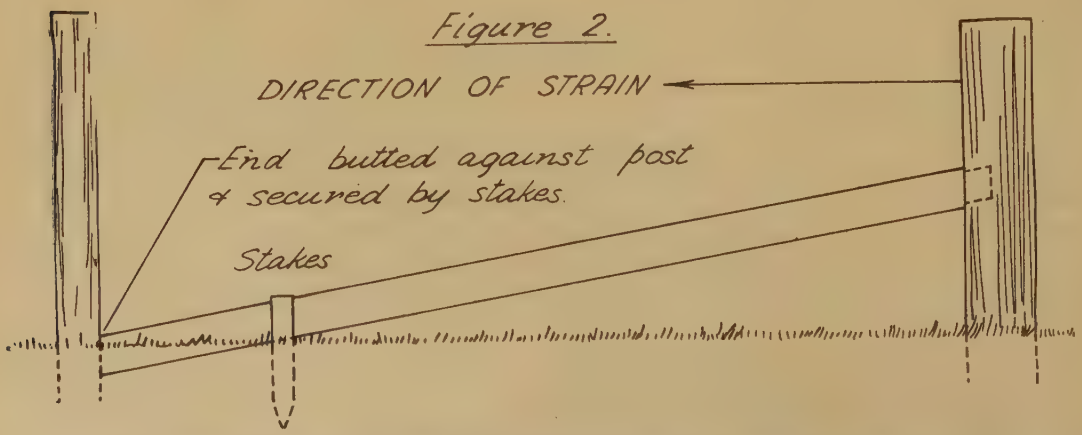


Fig. 2.—Common angle strut. The strut should be long and strong and kept low on the strainer post.

If the end of the strut is shaped to fit into the mortise it will "stay put." Failing this, scarfe the strainer deeply, trim the end of the stay to fit and secure with a spike.

Square Struts.—A type of strut which I prefer to the angle strut is a long, strong bar mortised into both the strainer and a fairly heavy post placed a convenient distance from it. The strut is horizontal and, being out of contact with the ground, is less likely to decay and lose its efficiency.

The important feature of this strut is the several strands of wire looped around the strainer at ground level and around the top of the other post (Fig. 3). These are twisted and tightened by a "Spanish windlass"—a stick passed between the strands. The twisted wire tends to force the top of the strainer post away from the direction of the pull

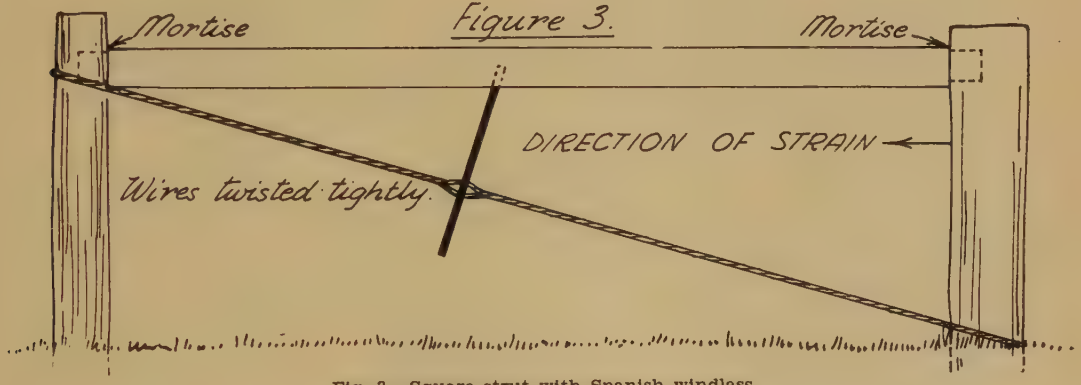


Fig. 3.—Square strut with Spanish windlasc.

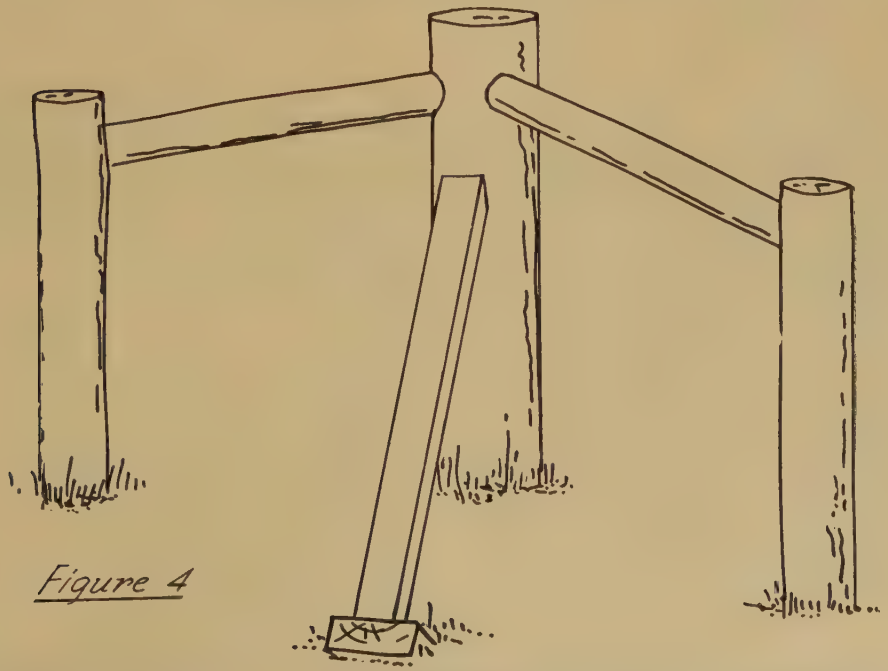


Fig. 4.—Extra strut placed in corner of paddock to give added support to the corner-post.

The Ideal Farm . . .

. . . . is acquired by the discriminating choice of the wise farmer, who, after years of experience on the land, has learnt that it pays to buy the very best when purchasing farm machinery; because, due to dependability it saves him time, labour and money; while at the same time it helps him to build his profits, his property and his farming reputation. We, as distributors for over half a century of the world's best tractors and the highest quality agricultural machinery available, are always at your service.

SOLE DISTRIBUTORS FOR W.A.

WIGMORES Limited

613 WELLINGTON ST. PERTH . . . PHONE BA2281

SOLE W.A. DISTRIBUTORS OF—

"CATERPILLAR" Track Type Tractors
"JOHN DEERE" Wheel Type Tractors
"STEELWELD" Motor Graders, Caterpillar Diesel Powered
"STEELWELD" Earth Moving Equipment
"SHEARER" Headers, Plows, Drills, Combines, Scarifiers, Cultivators, Mouldboard Plows, Harrows, etc.
"BUNCLE" Hay Pressers, Chaffcutters, Plate Grinders, Root Crushers and Power Mowers
"BUZACOTT" Rotating Power Spray Dips and Spretters for Sheep Jetting
"BUZACOTT" Engines and Pumpers
"WIGMORE" Milking Machines
"WIGMORE" Saw Benches, Baitlayers, Crusher Grinders
"WIGMORE" Windmills, Orchard Plows and Implements
"WIGMORE" Midget Fire Fighters and Low Volume Spray Booms
"WOLSELEY" Shearing Machinery
"MAY" Fertilizer Spreaders
"P.R.L." Aero Top Dressers and Rotary Mowers
"SHAVE" Plows and Attachments
"DIABOLO" Separators
"VINCO" Marine Engines
"R.J.M." Posthole Diggers
"FLEXICO" Post Boring Machines
"NUNAN" Irrigation Systems

★ WE SUPPLY ONLY THE BEST ★

Suppliers of SUPERPHOSPHATE, FENCING MATERIAL and GENERAL FARM MERCHANDISE

exerted by the fence-wires. The posts should be notched or bored to take the windlass wires.

Corner Posts.—These will naturally be strutted in two directions, using either the angle or square-type struts. In addition it may be advisable to put a third strut—usually an angle strut at 45 degrees to halve the angle (Fig. 4) and prevent posts from being tilted inward.

Intermediate Strainers.—These should be placed at intervals of not more than ten chains along the fence. As the strain is equal on both sides of the post they do not require strutting if the ground is reasonably firm. Sometimes it may be advisable to erect an angle strut on one side to take the initial strain.

TYPES OF FENCES

With the strainers in position we can decide on the number of posts to the chain and their height above and below ground level.

A good distance between posts is 11 feet, or six to the chain (480 to the mile) for an ordinary 6-wire or netting fence.

Generally speaking, the closer the posts, the stronger the fence but where suitable posts are difficult to obtain the distances between posts may be increased and the wires reinforced with wooden or metal droppers at suitable distances apart between the posts.

When building fences on borrowed money it is well to remember that many financial institutions have their own specifications for fences which lay down the minimum distance between posts; length and diameter of posts; spacing of wires and other details. Check up on these before commencing your fence.

Meanwhile, here are a few popular fence patterns which may be adapted to suit your requirements.

If posts 5 ft. 9 in. in length are used and sunk 1 ft. 9 in. in the ground we have a 4 ft. fence which lends itself to the fitting of 42-in. rabbit netting trenched 6 in. as shown on the left of the diagram in Fig. 5. This will require one barbed wire about three inches from the top of the post, a plain wire 12 in. from the top, another 29 in. from the top, and one at or near ground level

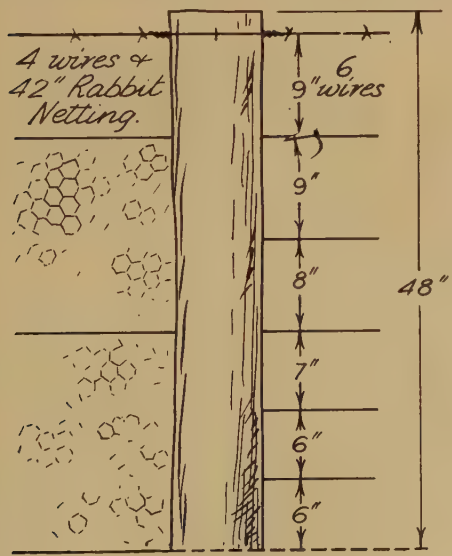


Figure 5.

Fig. 5.—Post 4 ft. above ground with spacings for rabbit netting and 6-wire fence.

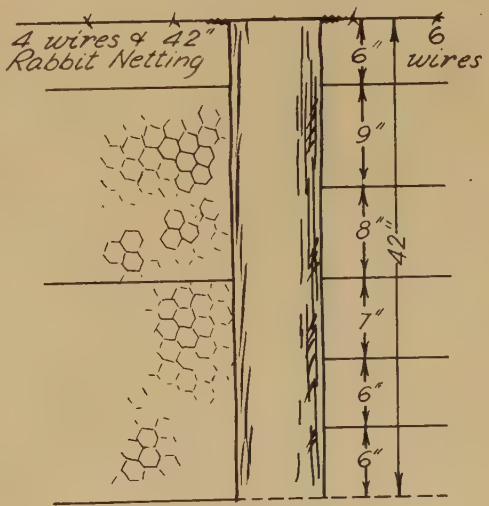


Figure 6.

Fig. 6.—Shorter post setting (3 ft. 6 in.) with netting or 6-wire fence.

48 in. from the top. Sometimes the lowest wire is omitted but it certainly makes for a stronger fence.

The same height of post may be used for six wires spaced as shown on the right of the diagram. This spacing allows for netting to be fitted, if desired, at a later date. Many people prefer a lower post setting and have 3 ft. 6in. above the ground as shown in Fig. 6. Here, the barbed wire is run along the tops of the posts.

Where 30 in. sheep netting is used, the fence pattern shown on the left of Fig. 7 is popular. This has posts 3 ft. 3 in. above ground. This pattern also lends itself to the erection of a sturdy 6-wire fence spaced as shown on the right of Fig. 7.

Figs. 8, 9, 10 and 11 depict a series of fence patterns approved by the Land Settlement Board for use on different types of farming properties. In the main, they are designed to serve where rabbit-netting is unavailable and is not likely to be fitted at a future date.

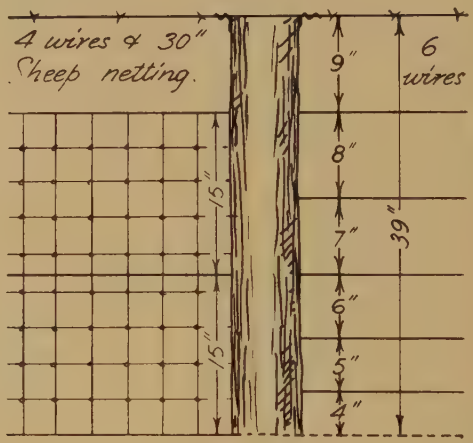
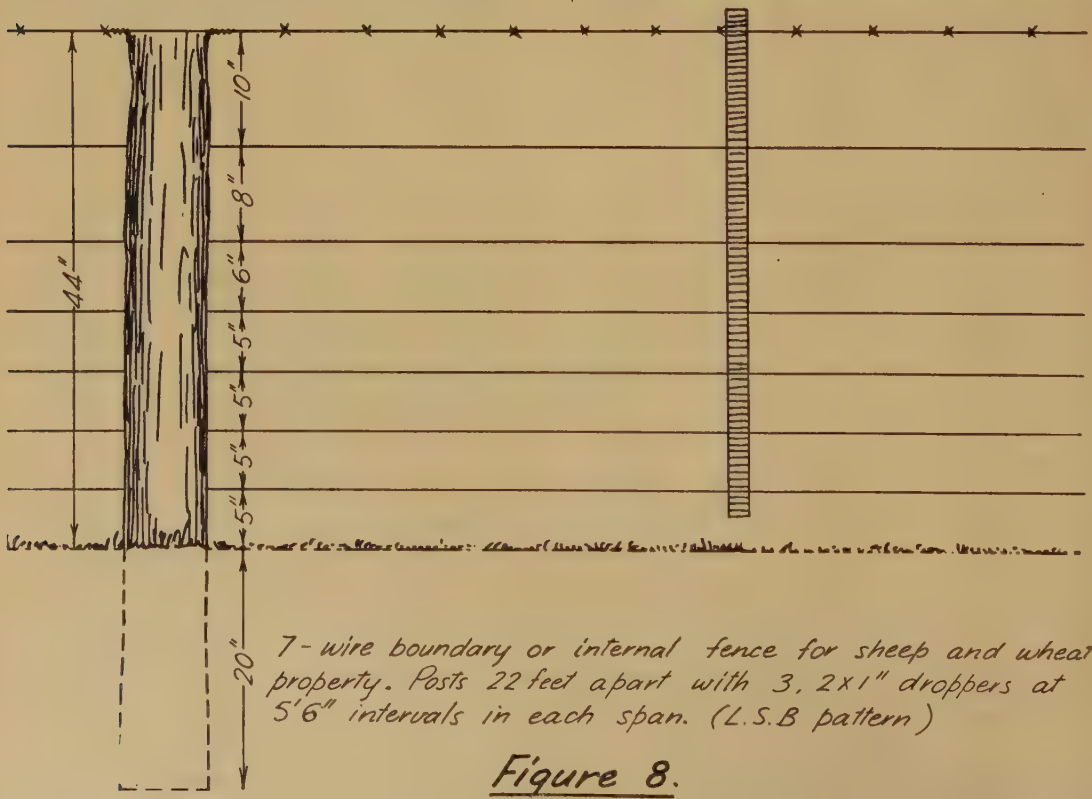


Figure 7.

Fig. 7.—Posts set 3 ft. 3 in. above ground to carry 30 in. sheep netting or 6-wire fence.



7-wire boundary or internal fence for sheep and wheat property. Posts 22 feet apart with 3, 2x1" droppers at 5'6" intervals in each span. (L.S.B pattern)

Figure 8.

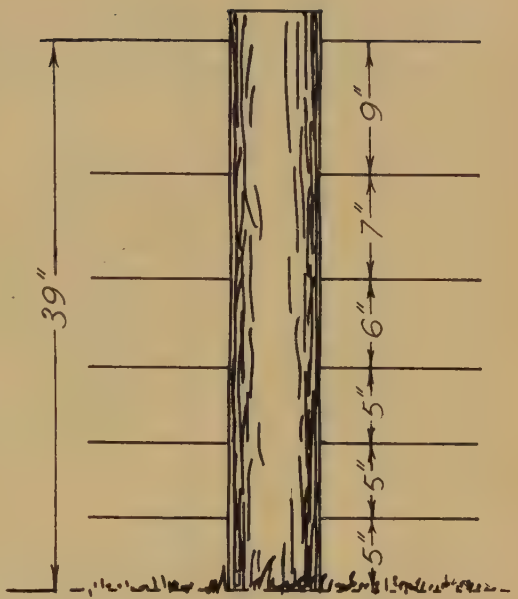
The boundary fence in Fig. 8 shows a type of fence used where supplies of posts are restricted. Posts are placed 22 ft. apart with three 2 x 1 in. droppers spaced in each span. This pattern gives a strong resilient fence and economises in posts and labour.

The netted boundary fence in Fig. 10 is suited to 30 in. sheep netting or 42 in. rabbit netting trenched 6 in.

Fig. 11 is a popular five-wire fence for the dairying areas. The top wire could also be barbed if supplies are available.

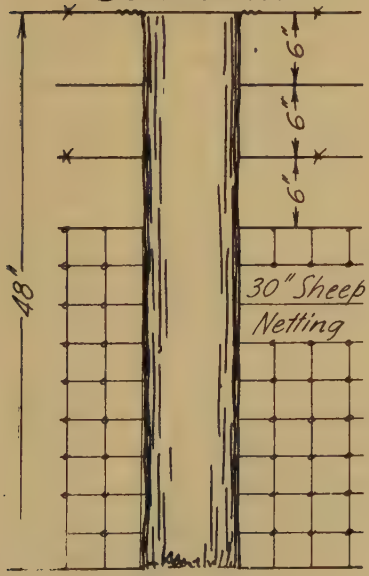
There are many other fencing patterns which may be used, according to the availability of materials, type of stock to be handled and other factors. Crossbred sheep usually require much stronger fences than merinos, while cattle may be confined in fences with wider-spaced wires than are needed for sheep.

Ordinary posts should be at least 20 in. in the ground however, and it is always advisable to space the wires in such a manner that the fitting of rabbit netting at some future date can be accomplished with a minimum of reboring.



6 wire boundary or internal fence for Merino sheep (L.S.B Pattern.)

Figure 9.



LEFT - 3 plain and 2 barbed wires with 30 inch sheep netting for cross-bred sheep or big stock.

RIGHT - 6 plain and 1 barbed wire for internal division fences.

Posts - 12 feet apart or 22 feet with 3 droppers in each span — L.S.B. pattern.

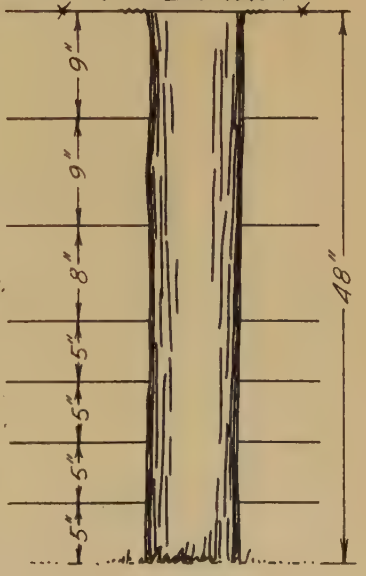


Figure 10.

Low-cost, versatile power and all this Standard Equipment*

SALES LEADER — over 30,000 Tractor Sales since 1945 — Fordson Major almost equals all other makes together!

VALUE LEADER — with all the equipment listed below — Fordson Major is unchallenged as *the lowest-priced tractor per h.p. rating.*

ALL-ROUND LEADER — in low-cost, versatile power, Fordson Major is the all-purpose tractor for ploughing . . . harvesting . . . orcharding . . . dairy and 'mixed' farming . . . cane grubbing . . . pasture renovating and so on. It's the tractor for stationary power, too . . . wood-cutting . . . pumping . . . post-hole digging etc. What's more, Fordson Major offers a choice of Kerosene or Diesel Power . . . choice of gear ratios to suit all soil conditions and a nation-wide dealer service that means "spare parts and service any time—anywhere!" But the most convincing test of all is A DEMONSTRATION ON YOUR OWN PROPERTY! Your Fordson Major Dealer will gladly arrange it.

* **STARTER** * **LIGHTS**
* **RADIATOR SHUTTERS**
* **BELT PULLEY** * **BRAKES**
* **POWER TAKE-OFF.**

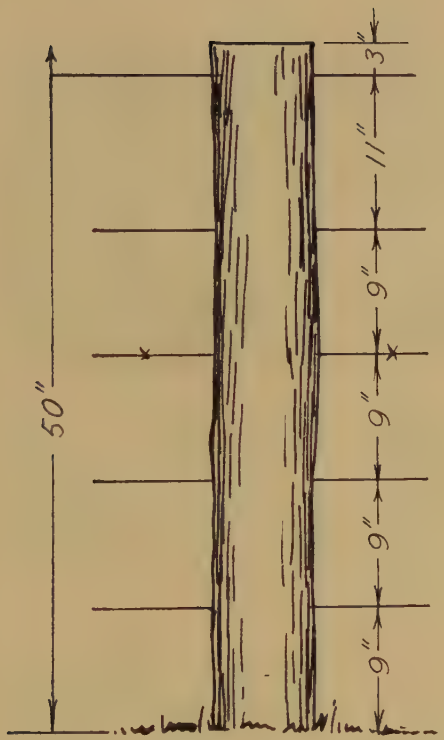
Compare these prices with those of any other tractor:

£641	£844	£1312
Kerosene Model with Steel Wheels	Kerosene Model with Pneumatic Tyres	Diesel Model with Pneumatic Tyres

FORDSON MAJOR FARMS AUSTRALIA

Enquire from your local Fordson Dealer FM35-24

FORD MOTOR COMPANY OF AUSTRALIA PTY. LTD.



4 plain and 1 barbed wire for Dairy farm fences. Posts 12 feet apart - L.S.B pattern.

Figure 11.

ERECTING THE POSTS

When erecting posts you will need a light measuring-rod cut to give the distance between posts, a post-hole spade, crowbar and rammer.

The post-hole auger shown in the heading block is a handy tool for sandy or friable soils without an admixture of gravel and pebbles, but is not particularly effective in hard, stony ground. Most old hands prefer a good crowbar and a post-hole spade.

Sight carefully along the sight-stakes and dig out the surface soil to commence the hole. A depth-gauge may be made from two pieces of light wood nailed in the form of a cross with the short piece 21 in.—or whatever depth is required—from the lower end. Most old hands merely cut a nick in the handle of the spade to give them an idea of the depth.

Remove as much soil as possible with the spade, then loosen up more soil with the crowbar until the required depth is reached. Place the post in the hole and sight it carefully along the sight-stakes for both height and alignment.

The tops of the posts should be in a straight line and should not be influenced by minor irregularities of the ground surface, otherwise the task of running the wires will be made very difficult, and the appearance of the fence will suffer.

When you are satisfied that the post is well placed, kick in some earth and ram it well, checking the position of the post periodically during the process. Earth well rammed in the bottom of the hole is what holds the post firmly.

A good rammer can be made from an old axle-box from a sulky or buggy wedged on the end of a suitable handle (Fig. 12), but any scrap material may be used. Some fencers have a round piece of metal welded to the top of the crowbar for use as a rammer but this is apt to be awkward to handle.

There are two schools of thought on fence-post boring. Some people prefer to bore the posts before they are erected, others prefer to bore them when they are in ground.

This, and other subjects will be discussed in the July - August issue.

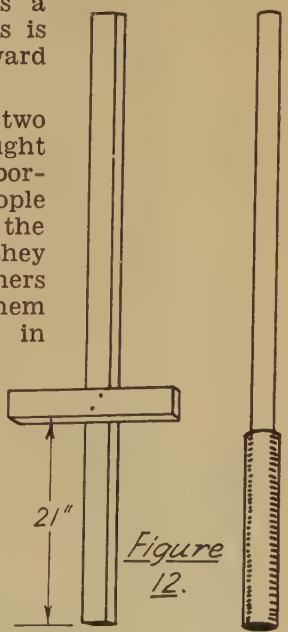


Figure 12.

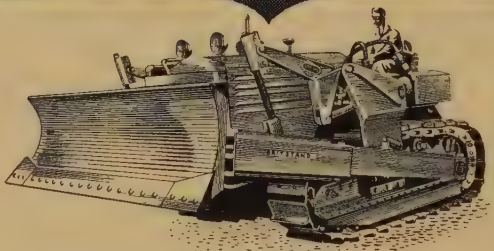
Fig.12.—Depth-gauge (left) for use when digging post-holes. A rammer (right) made from an axle-box from a buggy or sulky.

For Agricultural purposes....For Land Clearing & Dam Sinking

OLIVER
CRAWLER & WHEEL TRACTORS

BRITSTAND
EARTH-MOVING EQUIPMENT

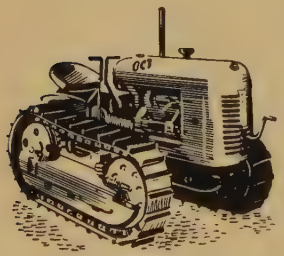
OLIVER Crawler "DDH" equipped "BRITSTAND" Hydraulic Trailbuilder The "DDH" is available with OLIVER Air Steering and has a maximum draw-bar h.p of 61 19



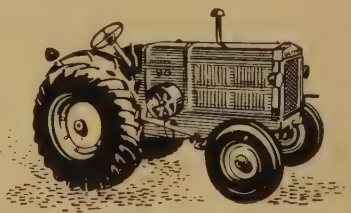
Proved on Stations, Farms and Industrial Projects. . . . OLIVER Crawler Tractors and BRITSTAND Earth-moving Equipment can make a great contribution to the development of your land and to the conservation of precious water.

The complete range of OLIVER Crawler and Wheel Tractors:

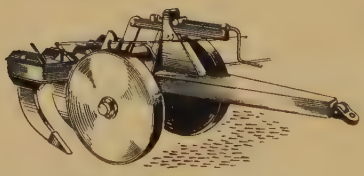
CRAWLER	Draw-bar H.P. (max.)
OLIVER "OC3-42"	21.85
OLIVER "AD"	30.5
OLIVER "BD & BDH"	38.05
OLIVER "DDH"	61.19
OLIVER "FDE"	110
WHEEL	
OLIVER "90"	42



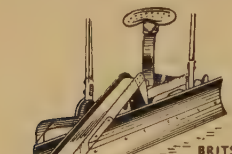
The OLIVER "OC3-42". A tough little tractor, for Market Gardeners, Potato Growers, Orchardists and Farmers. Maximum draw-bar h.p. of 21 85.



The OLIVER "90". A powerful, reliable wheeled tractor for year round farming. Powered with a slow-revving KEROSENE Engine providing 42 h.p. (max.) at the draw-bar

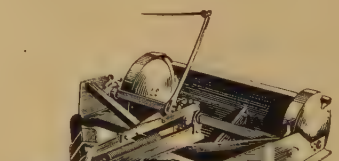


BRITSTAND R52A RIPPER for breaking up hard soils including gravel Ripping rabbit warrens, etc. Does five times as much work as heavy plough For use with crawler tractors of 25-40 draw-bar h.p



BRITSTAND Grader Ditcher. A combination grader and ditcher For Farm and Station road work. Preparing water catchment areas, etc. May be drawn with tractors or in light work by a motor truck

BRITSTAND Rotary Fresno for damsinking and all classes of levelling and filling. Provides a cheap, fast method of moving dirt. Use with Crawler tractors of 25 draw-bar h.p and over.



OLIVER - BRITSTAND
CRAWLER TRACTORS — EARTH-MOVING EQUIPMENT

SKIPPER BAILEY MOTOR CO. LTD.
431 MURRAY ST. PERTH. Phones B7174 & B6869 . . . . . 14 PRINSEP ST. BUNBURY

Reduction of Pre-Harvest Drop of Washington Navel Oranges by 2,4-D Sprays

By N. J. HALSE, B.Sc. Agric., Research Officer

THE uses of various synthetic "plant hormones" in agriculture are many—one of the most generally known of these uses being their action in reducing pre-harvest drop of fruit. Naphthalene acetic acid, commonly known as N.A.A. is widely used for this purpose with apples, but 2,4-Dichlorophenoxyacetic acid, commonly known as 2,4-D, is much more effective with citrus fruit.

Following a successful demonstration of the effect of 2,4-D spray in reducing mature fruit drop of Navel oranges under local conditions, it was decided that a further investigation was warranted to see whether such a spray could be combined with a routine citrus spraying. As the cost of the 2,4-D used is negligible the cost of application is the main consideration. If a special operation can be avoided by incorporating the hormone in a routine spray, such as white oil or Bordeaux mixture, the cost is so low that application of the hormone is economic for even a small reduction in fruit drop. This is particularly important as fruit drop is variable and annual use of the hormone is needed in case of a year of severe pre-harvest drop.

SUMMARY OF PREVIOUS INVESTIGATIONS

Jones (1) in an experiment carried out locally showed that July spraying with the hormone reduced fruit drop from 25% to less than 10%. In this case the rather high concentration of 20 p.p.m. was used. In recent American work Stewart (2) has successfully used low concentrations (4 parts per million) with a late summer oil spray. Winter spraying at 8 parts per million showed little additional benefit.

PRESENT INVESTIGATIONS

In the investigation carried out on 2,4-D in combination with routine sprays, five treatments were applied; their details are given below:—

(a) Control—no spray.

(b) Sprayed with 4 p.p.m. 2,4-D (free acid equivalent) on March 14 in a white oil spray.

(c) Sprayed with 4 p.p.m. 2,4-D on April 19 in dispersible copper fungicidal spray.

(d) Sprayed with 8 p.p.m. 2,4-D on April 19, in dispersible copper fungicidal spray.

(e) Sprayed with 8 p.p.m. 2,4-D on June 18, in water.

The source of 2,4-D for the experiment was a commercial preparation containing the ethyl ester at a concentration of 9.6% free acid equivalent. Considerable care is necessary in making up the solutions. The concentration of 8 p.p.m. is equivalent to 1¼ oz. of the commercial preparation per 100 gallons of water.

EXPERIMENTAL PROCEDURE

The experiment was carried out on the property of Mr. J. E. Anderson, Upper Swan. Thirty Washington Navel orange trees bearing a reasonable crop were selected. The layout consisted of six blocks of five trees each block containing the five treatments.

The treatments were applied with a knapsack spray to avoid spreading the material on adjacent tres. The rate of application was approximately three gallons of the spray solution per tree.

On 21st May the fallen fruit was counted and removed from beneath the trees and these counts were repeated at intervals until harvest. A division into sound and unsound fruit was made. It was assumed that this division would separate fruit which fell due to fungal infection from fruit which fell due to a weak abscision layer. It is the latter type of fall which is reduced by the hormone spray.

During the latter part of the trial the incidence of "water soak" was very high and the number of unsound oranges increased rapidly. Due to this fact the oranges were picked and counted on 7th August, somewhat earlier than originally anticipated. As the fruit was picked a count was kept of the number of buttons which separated from the oranges.

Information which was obtained concerning the total number of fruit on each tree, the fruit size and the detailed numbers of fallen fruit sound and unsound, was not considered to be relevant to the conclusions and has not been included in the results.

GRAPH OF PROGRESSIVE DROP OF SOUND FRUIT.

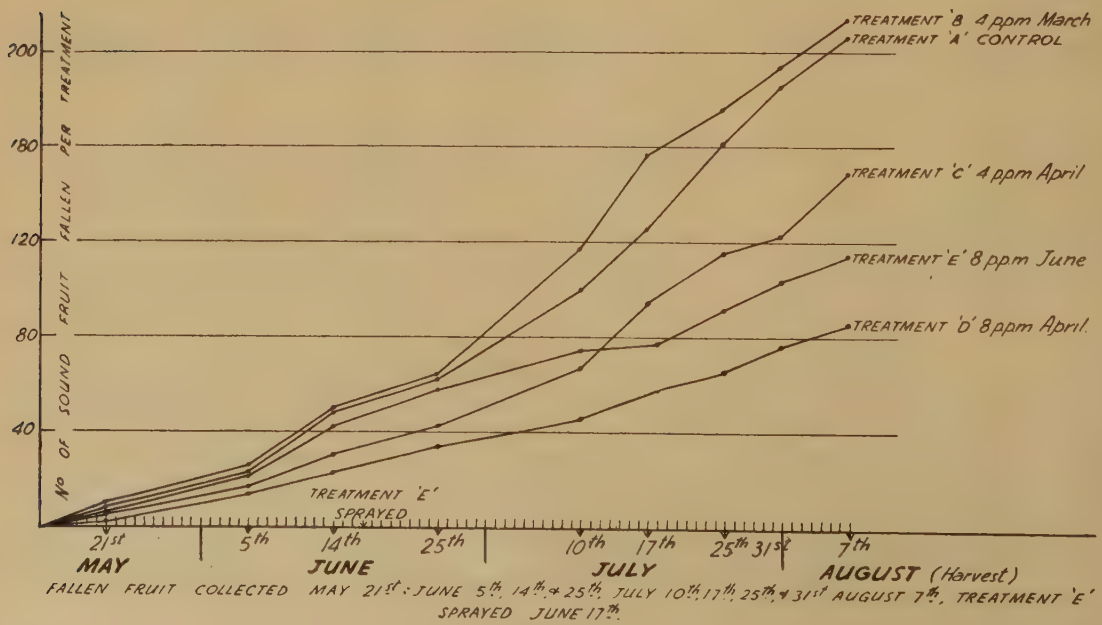


DIAGRAM SHOWING TOTAL PERCENTAGES OF SEPARATED BUTTONS.

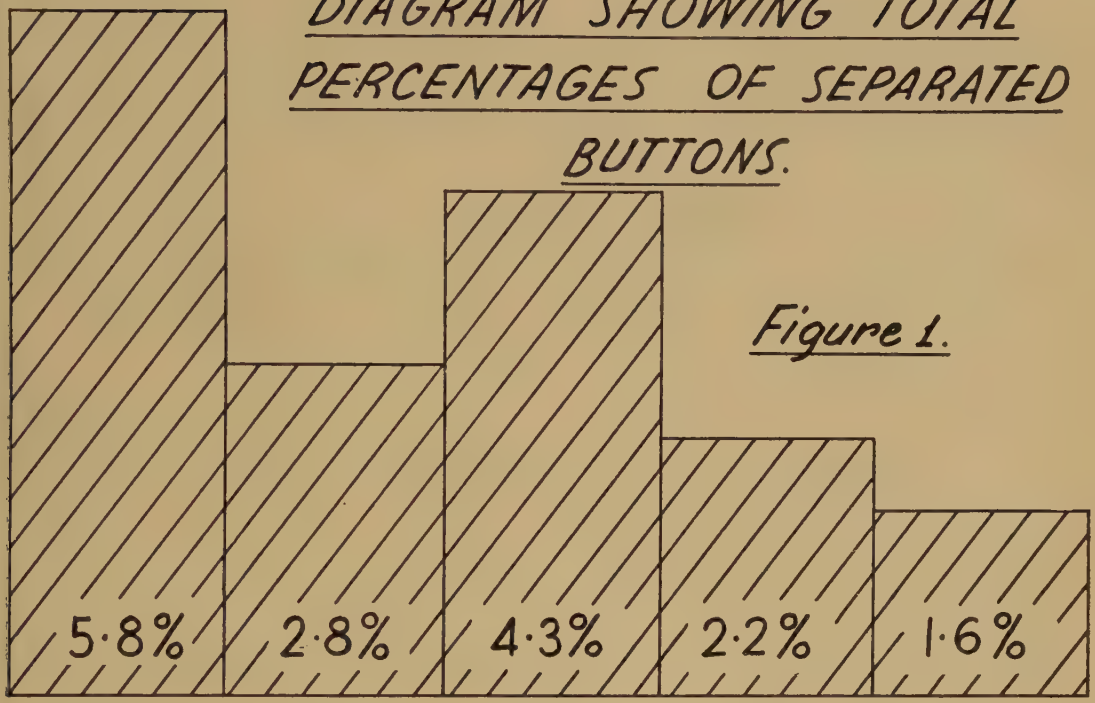


Figure 1.

PERCENTAGES OF SOUND FRUIT FALLEN.

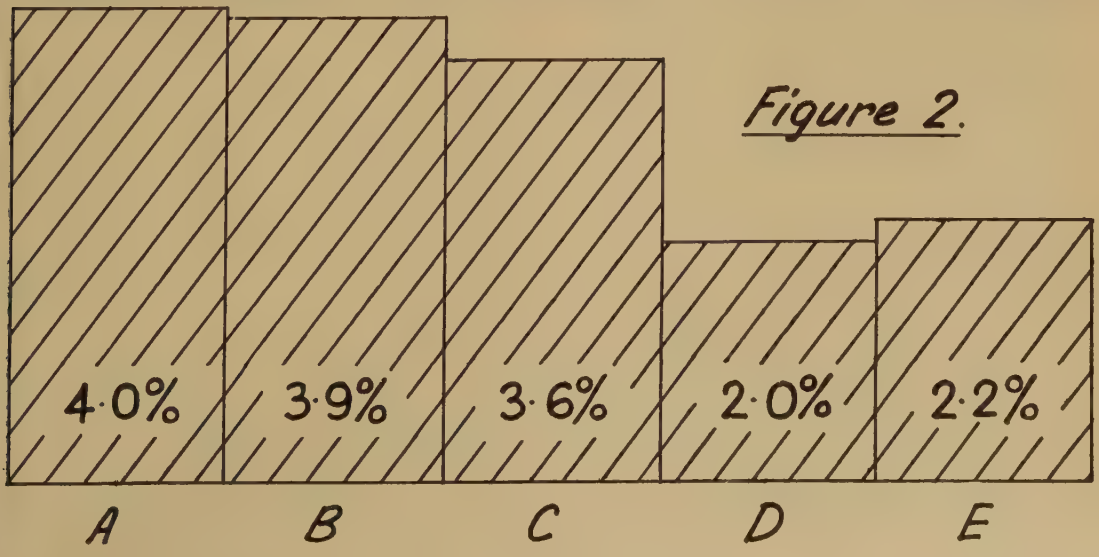


Figure 2.

DISCUSSION OF RESULTS

The striking feature in the experimental results was the very light fall of sound fruit. In a previous investigation on this property by Jones (1) the untreated trees had dropped 25% of their total crop and most of the fall was sound fruit; but in this experiment the maximum fall was 4% of sound fruit from the control trees. The difference may be due to the improved nutrient status of the trees or to a seasonal effect.

The fall of unsound fruit was not influenced by treatment—it was of the same magnitude as the fall of sound fruit.

An investigation of separated buttons showed a considerable amount of variation within treatments (see Fig. 1). Statistical analysis indicated, however, that the treatments were significant; this means the differences were due to treatments rather than to chance variation between trees. A summary of the results shows that the two treatments sprayed with 8 p.p.m. had less than half the percentage of separated buttons of the control treatment.

A study of the effects of the treatments on the fall of sound fruit shows that—

Treatment B—4 p.p.m. 2,4-D applied in March in routine white oil spray had no effect in reducing the number of fallen fruit.

Treatment C—4 p.p.m. 2,4-D applied in April with copper fungicidal spray; the reduction in the number of fallen fruit was not significant.

Treatment D—8 p.p.m. 2,4-D in April with copper fungicidal spray; the reduction in the number of fallen fruit was statistically significant. Therefore the treatment definitely was reducing the fall of fruit—the reduction was not due to chance.

Treatment E—8 p.p.m. 2,4-D in June; the reduction in the number of fallen fruit was statistically significant, again indicating a definite effect of treatment.

CONCLUSIONS

The experiment showed that a concentration of 4 p.p.m. was inferior to 8 p.p.m. in reducing the preharvest drop.

The March application of 4 p.p.m. was not effective in reducing the fall but a higher concentration might have been successful. The applications in April and June were both effective in reducing the number of fallen fruit.

It was shown that a 2,4-D spray of 8-10 p.p.m. can be successfully combined with an early winter copper fungicidal spray. This 2,4-D spray reduces the pre-harvest drop of Washington Navel oranges. Another likely benefit of the spray would be the reduced number of oranges with separated buttons.

REFERENCES

(1) Jones, L. T., *Journal of Agric., W.A.*, 28, 1 (1951).

(2) Stewart, W. S., *California Citrograph*, 36, 2.

CHART FOR PACKING APPLES

A chart giving details of the correct method of packing apples is now available at the Department of Agriculture, Perth, or from District Officers. This chart embraces packs for apples of various shapes, such as round, flat, long and medium long types with brief explanatory remarks.

It is printed in two forms; a wall-type chart for packing-shed use and a small pocket-size folder.

SEASONAL REMINDERS

Suggestions for July-August Activities

WATCH FOR WEEDS IN WHEAT CROPS

By OFFICERS OF THE WHEAT AND SHEEP BRANCH

DURING July, keep an eye on the crop and pasture paddocks and note any new weeds which may appear. Farms may often be kept free of noxious weeds by hand pulling or hoeing in the early stages before the plants have a chance to assume serious proportions. Any suspected new plants should be sent to the Government Botanist for identification.

Wet weather often provides opportunities for carrying out odd jobs around the homestead and sheds, such as building renovations and the repair and adjustment of machinery and other equipment. Now is a good time to sort out secondhand bags, to carry out a few repairs where needed and tie up super sacks in bundles of two dozen ready for refilling.

The fallowing programme should be pushed ahead, and early fallow may require working to destroy weeds or restore tilth.

See that the hay-cutting machinery is in good order ready for a trouble-free run when it is needed. Plan your grain and fodder requirements. Select and shut up paddocks for meadow hay.

Prepare yards, sheds and gear for the coming shearing. Order wool packs, branding fluid, raddle, etc.

Class and cull the flock before shearing to make drafting and wool-classing easier during the rush period. Book ram requirements.

August sees the commencement of shearing in early districts. Brand shorn sheep with registered wool brand and recommended fluid. Clean up the shed, store machinery and list any new parts required.

Most pastures can be grazed heavily at this time of the year, but frequent changes are desirable. Give the best grazing to ewes with lambs. Market early fat lambs.

Tobacco Notes for July and August

By T. G. HANEY, B.Sc. Agric., Acting Officer in Charge Tobacco Industry

GRADING by this time should be almost complete, since the first consignment of leaf for Fremantle should be on approximately July 10. The more leaf which can be sent away during July, the better it will be for all concerned.

It is advisable for any new grower who has not been to a tobacco auction to visit the sale floor. This enables a comparison of grading and setting up of other crops, and will bring to light any possible defects in the showing of individual grower's crops. Buyers are willing, provided they are not too busy, to answer questions and give information which may be of value.

Seedbeds.—Preparation of tobacco seedbeds should commence in July. The site should be on a well-drained soil, preferably with a gentle slope to the east in order to obtain the maximum amount of early morning sunlight, and some protection on the south and west against cold winds. The ground should be kept free from weeds for as long as possible before the sowing of seed and the area required should include a bare strip five to six yards all around the seedbed as a protection against insect pests. Soil requirements are good drainage, on a light loam or gravelly soil. Heavy soils are not recommended as they tend to form a hard crust on the surface, thus preventing penetration of the small rootlets.

In constructing the seedbed frames, remember that they should be airtight. For this reason, sash tops are not recommended, since an airtight seal cannot be obtained with a wood to wood join. Roller tops give a much better seal. The use of "Windolite" causes the seedbed surface to dry out too quickly under direct rays of the sun.

For land to be planted in mid-October, seed should be sown at the end of July, with subsequent sowings at weekly intervals. Seed sown towards the end of August will take less time to germinate and grow to the required size due to higher temperatures.

After the seedbed is in good tilth and **level,** the frames can be placed on the surface. One pound of tobacco fertiliser per square yard is worked in to a depth of three inches. Seed is then sown at a rate of 1 ounce per 100 square yards of seedbed area. In a well-sown seedbed, there should be 750 to 1,000 plants per square yard. It is suggested that a covering of coarse sand be given after sowing of seed. This forms a mulch on the surface, minimising excessive drying out of the soil and also preventing washing of the seed while watering. The surface soil must not be allowed to dry out during the germination period. This is the most common cause of failure to germinate.

After sowing, the beds should be kept open as much as possible, with water applied to keep them moist. Lack of aeration of the beds creates conditions favourable to the development of fungi which cause "damping off."

"Damping off" can be controlled to a certain degree by the use of "Cheshunt Mixture". It is advisable to use the mixture before sowing and at weekly intervals after germination.

Lack of aeration of seedbeds also causes the development of a green scum on the surface. The use of Bordeaux mixture will destroy the scum without injury to tobacco seedlings.

Bordeaux mixture is made in the following manner:—

Dissolve 1½ lb. copper sulphate in 2 gals. of water.

Mix 2 lb. hydrated lime in 2 gals. water.

Fill a 25 gallon drum three-quarter full, add lime, and then the copper, stirring vigorously. Add water to 25 gals. and apply at the rate of 25 gals./100 sq. yds. The first application is immediately after the plants germinate and the second, 10 days later.

Always remember that prevention is better than cure. Therefore—

1. Select the correct seedbed site.
2. Made certain the seedbed surface is level.
3. Make seedbed frames as airtight as possible for the use of benzol at a later stage.
4. Give the seedbeds ample ventilation. They, like you, need plenty of fresh air.

USE CARE WHEN INOCULATING

CONTRIBUTED BY THE VETERINARY BRANCH

RECENTLY, mortalities from tetanus involving the loss of a large number of sheep have occurred as a sequel to the inoculation of flocks with entero-toxaemia vaccine and other biological products.

Although mortalities may sometimes result from the reactivation of spores lying dormant in the tissues at the site of injection they are usually associated with the use of vaccine which has become contaminated with tetanus spores at the time of inoculation.

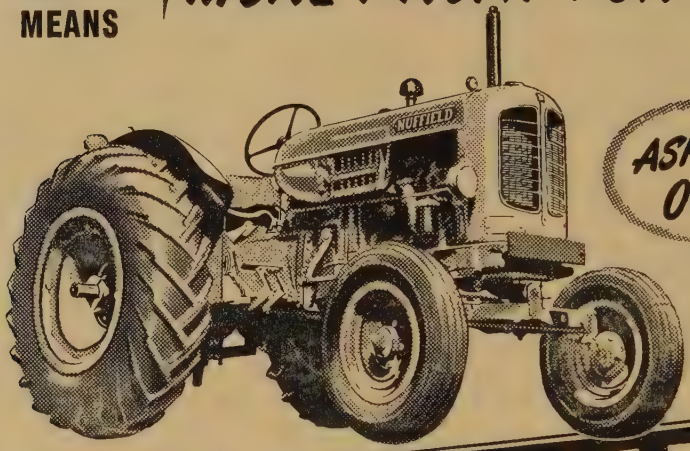
When a hypodermic syringe is used, it is necessary to transfer the vaccine from the bottle in which it is supplied to a container such as a cup, or small basin, from which the syringe is recharged as required. Unless this container is kept covered it is likely to become polluted with dust containing tetanus spores. The risk is greatest when inoculation is carried out in dusty yards and it may be minimised by using the shearing shed for the operation.

In addition, the syringe and needles should be sterlised by boiling for five minutes before use, and by keeping needles which are required as replacements in a jar of methylated spirits. Losses from tetanus may be prevented to a large extent by the use of an automatic vaccinator which may be plugged into the bottle in which the vaccine is supplied thus eliminating all risk of contamination by dust.

This instrument, together with the rubber tubing connecting it with the vaccine bottle, must however be sterilised by boiling on all occasions before being used.

THIS TRACTOR MEANS

MORE PROFIT FOR YOU!



ASK ANY OWNER

NUFFIELD

UNIVERSAL TRACTOR

Does more jobs per year, more work per day, on less fuel per hour!

Its 6-way power fits it for so many jobs all through the year that its cost per tractor-hour is low. Its drawbar h.p., highest in its class, means it does more work per day. And its fuel-thrift—Western Australian owners report an average consumption of 1½ gallons per hour—means big savings on your fuel bills! In short, Western Australian owners agree here is a tractor that **has** everything, **does** everything **better, quicker** and **cheaper!**

★ You get the same versatility, efficiency and even greater economy with the Nuffield Universal Diesel.

DISTRIBUTORS FOR WESTERN AUSTRALIA:

PARK LANE MOTORS PTY. LTD.

926-928 Hay Street, Perth

(Temporary Premises)

A NUFFIELD PRODUCT

ON-THE-FARM SERVICE, GENUINE SPARE PARTS AND IMPLEMENTS ARE AVAILABLE FROM AUTHORISED NUFFIELD DEALERS THROUGHOUT THE COMMONWEALTH

AUTHORISED NUFFIELD DEALER

NT7.24.52

NUFFIELD (AUSTRALIA) PTY. LTD., VICTORIA PARK, ZETLAND, NEW SOUTH WALES

TIMELY HINTS ON CHICK BROODING

By L. J. GAFFNEY, B.Sc. Agric., Poultry Adviser

AFTER thoroughly cleaning the brooder house, the floor should be disinfected and covered with three to four inches of clean dry saw-dust. (See March-April issue of the Journal.) The brooders should be in operation one or two days prior to receiving the chickens to ensure temperature stability. For the first three weeks the temperature should be 95° F. and then reduced gradually to 85° F. at the end of the fifth week. During the final two or three days in the brooder house the heat should be cut off completely.

During the brooding period the litter under and around the brooder should be frequently examined for any sign of dampness. After the first 10 days the litter should be stirred to floor level daily and a little slaked lime incorporated if dampness is suspected.

For the first three days the chickens should be confined to the brooder by placing a ring of flat iron one foot high around the brooder, care being taken that sufficient space is allowed between the brooder and the ring to avoid over heating the chickens. As different makes of brooders vary in their heat output, the attendant must exercise his own judgment in determining the actual space allowed.

At 12 to 14 days the chickens should be allowed outside the brooder house. Care must be taken not to expose them to cold winds. A good scheme is to fence off a small portion of the yard with sheets of corrugated iron for the first few days. Green feed, such as rape, grown in the brooder yard, helps to keep the chickens active, in addition to supplying essential vitamins and minerals.

During the chickens' early life the weather conditions largely decide the management programme. Especially during the first six weeks they should not be exposed to severe changes in temperature and wet conditions should be avoided.

At five to six weeks of age, depending on the weather, the birds are transferred to rearing houses where they should be confined for a few days. Warm nights usually accompany wet weather and these conditions are suitable for the transfer of chickens to the rearing pens. On being let out, the running area should at first be limited and gradually increased as the chickens become accustomed to their new quarters.

The rearing house should be provided with a perching platform and the floor covered with dry sawdust to a depth of three inches. Teaching the chickens to perch at an early age is an important phase in their rearing. This is facilitated by the use of the perching platform which is constructed of slats 3 in. wide and 1 in. deep with a space of 1 in. between each slat. The platform is built at the rear of the shed, the slats being supported so that they are 6 in. above the litter. Provision must be made to see that the chickens cannot get under the platform and that they cannot crowd on to the cold wall of the shed. A board 6 in. wide and nailed to the inside of the studs will achieve this latter requirement. It is usually necessary at first to

train the chickens to perch on the platform but after driving them on to it for about five consecutive evenings at dusk they will camp on the platform of their own accord.

The maximum number of chickens allowed to congregate in any one group should be 150, but perferably not more than 100. After three weeks on the platform the chickens will migrate to permanent perches which are installed 1 ft. above the platform. All chickens should be perching when they are nine weeks of age and this is one of the most important management practices in the successful raising of chickens.

Feeding Breeding Hens.—The breeding hens' diet must contain adequate Riboflavine if good hatchability from their eggs is expected. The commercial powder "Ribon" or buttermilk powder are excellent sources of this vitamin.

IN THE ORCHARDS

By F. MELVILLE, B.Sc. Agric., Acting Assistant Superintendent of Horticulture

THE pruning of fruit trees and vines may be commenced as soon as the trees or vines have become dormant but may be carried out any time before the break of dormancy in the spring. Almonds and early peaches will require pruning before mid-July as blossoming commences at this time. Other stone fruits and pome fruits are pruned during August and September. In districts where varieties of peaches and nectarines tend to shed their flower buds, pruning of laterals can be delayed until flowering is completed. A leaflet on the pruning of vines is available from the Perth office.

Fruit trees can be grafted either while dormant or just as they are breaking dormancy. If early grafting is desired a cleft method should be used. The various bark grafts can only be successfully performed after the sap has started to flow and the bark lifts easily. It is essential to use completely dormant scions and they should, therefore, be selected during the dormant period and stored in a cool moist place until required. It is usual to completely bury the scions horizontally in a moist but not wet situation.

NEW PLANTINGS

Young fruit trees should be planted on well prepared sites properly levelled and free from old tree stumps and roots, and preferably on land which has carried a cover crop the previous season. Up to 2 lb. of a mixed fertiliser should be thoroughly incorporated with the soil in each hole before planting; care must be taken to ensure that the roots do not come into direct contact with fertilisers used.

Before planting, prepare the tree by shortening back sound roots with a clean cut and removing all damaged ones. Plant to a depth not greater than the tree was growing in the nursery and firm the soil well around the roots. Reduce the top, in the case of a whip, to 15 to 18 inches while for a formed tree select if possible three well-spaced branches and shorten to six to eight inches. This will apply to citrus as well as deciduous trees.

Plant deciduous trees in time to enable the rooting system to become established before the top growth shoots. Citrus planting should be delayed until the danger of heavy frosts is past. Provided moisture supplies are adequate planting may be left as late as September.

DISEASE AND PEST CONTROL

Anthracnose of Vines.—At pruning remove and burn canes showing lesions. Spray during the dormant period with a mixture of 10 to 15 lb. of bluestone in 40 gallons of water.

Dormant Sprays for Deciduous Trees.—A spray of one part of red spraying oil to 15 parts of water should be applied after pruning for the control of San Jose' Scale, Bryobia Mite and Mussell Scale. Alternatively lime sulphur at a concentration of one part in seven of water may be used as a late dormant spray.

Shothole of Stone Fruits.—Stone fruits including almonds should be sprayed thoroughly at the "early pink bud" stage with 6:4:40 Bordeaux mixture. If an additional spray is required use 1:100 lime sulphur except for apricots for which 3:4:50 Bordeaux is necessary.

Peach Leaf Curl.—The "early pink bud" spray of 6:4:40 used for Shothole will deal with this disease.

Fruit Fly.—Periodic baiting as the weather permits during the winter months is beneficial in reducing the fly population for the ensuing spring and summer. Use a mixture of—

1 oz. sodium fluosilicate,
2½ lb. white sugar,
4 gallons water,

or the proprietary mixture Lurotox.

For advice on orchard problems the district Horticultural Instructor is available to assist.

FOR THE BEEKEEPER

JULY is regarded by many beekeepers as one of their quiet months of the year, but in actual fact the foundation of the season's work is laid during this time. All maintenance must be finished by the end of July if full use is to be made of the fruit blossom and other short but good flows in spring, when the bees start to build up from the winter cluster.

Make sure that the honey house, equipment, and truck are in a good state of repair. In particular, replace anything that is liable to break down during the honey flow.

All frames should be repaired or replaced, and spare frames fitted with new wire and new foundation comb. Hives should be repaired and painted.

Watch the stores in the hive. If they are short, lay an empty drawn comb flat on the top bars of the frames in the super, and pour honey water (four parts of honey to one of water) into the cells and replace the frame. Very liquid honey can be used instead. This will stimulate the queen to lay and build up the hive for the early flows.

If any hive appears weak, and the queen and her brood pattern appear healthy, boost the colony by shaking some bees off frames from some of the strong colonies on to the ground just in front of the entrance to the weak colony.

As the fine days appear, the hives should be examined and all colonies with queens that appear old and failing should be marked for requeening later.

In August, queen raising should be started. The earlier fruit trees and Cape-weed are excellent for queen raising, and in starting the bees building up, ready for swarming.

FALLOWING IN RELATION TO SOIL CONSERVATION

By OFFICERS OF THE SOIL CONSERVATION SERVICE

WITH the time for fallowing at hand we should give some thought to this farm practice, and consider its relationship to soil conservation and the liability of soils to erosion by wind and water. Fallowing is a practice of preparing land for crops some time ahead of the planting date. It is done for convenience to spread the year's operations, and also to improve crop yields. It causes the soil to be left more or less bare for several months, yet for soil conservation, surface cover of living or dead plant materials is constantly advocated. How can convenience and yields be fitted in with soil conservation?

Many soils of medium and heavy texture on flat or gently sloping areas can be safely fallowed without fear of serious erosion. But even in such cases excessive working of the soil, especially when dry, should be avoided. Cultivation when the soil has the right moisture content can improve the soil structure, but if done with the soil too wet or too dry, cultivation will tend to destroy the structure and so increase the liability to erosion.

The value of cultivation has often been over-stressed; the soil should be cultivated as little as possible consistent with the killing of weeds and the preparation of a seed bed. The farmer should not aim at the maintenance of any fine soil mulch, which has wrongly been credited with the virtue of retaining soil moisture; rather should he strive to keep the surface soil in a cloddy condition which will allow maximum absorption of water.

Fallowing of sandy soils should aim to leave them rough and ridged, and in some cases grazing crops of oats or rye may be grown, and fallowing done later in the season after partial grazing. A rough surface, with some grass or straw trash, reduces wind velocity at ground level, and so too, the likelihood of wind erosion.

Where the rainfall is sufficient to grow subterranean clover the soils on which it grows will, in most cases, later produce good cereal crops without a period of bare fallow. Many farmers have reduced the area fallowed yearly to the minimum which enables them to do their seeding in time the following season. They consider that any reduction in the yield of the cereal crop is made up for by the extra period of grazing from the area concerned and by the lessening of the risk of soil erosion.

Fallowing of Drainage Depressions.

When preparing to fallow a paddock, a farmer should first consider what happens when there is sufficient rain to cause water to run off the land, and where this run-off water will concentrate and flow in the paddock, whether it comes from the paddock itself or from higher slopes, roads, or other areas which may shed water freely.

In many paddocks where water erosion has occurred the most obvious sign of erosion is usually a gully situated in the main depression through the paddock. This gully has probably started when the surface soil in the depression was in a cultivated condition and heavy rain has caused water to flow down the depression. Once a gully is formed in such a situation it usually becomes larger and encroaches further up the slope with each flow of water; and in some cases this encroachment is caused by seepage

alone. It is then necessary to go round the gully, and the paddock is divided for all farm operations involving the use of machinery or vehicles. The reclamation of such a gully is difficult, since besides the filling of the gully it is usually necessary to construct expensive earth works to protect the filled-in gully while it becomes re-grassed and stabilised.

Bearing these facts in mind the farmer who looks ahead will avoid ploughing any area where he knows water is likely to flow in any quantity. This means that he will have a well-grassed depression instead of a possible steep-sided gully. This strip will have to be avoided when cultivating, but can be crossed for any other operation such as top dressing or harvesting and possibly could be seeded with the rest of the paddock. Also, if it becomes necessary later to plan and construct a system of contour banks to control erosion on the slopes of the paddock, then the grassed depression is ready as the best and safest area to take the discharge from the banks. This would eliminate what is usually the greatest difficulty in planning a contour bank system—finding a safe waterway.

Earth-Moving Work for Soil Conservation Practices.

In a soil conservation programme of reclaiming eroded areas and providing protection for soils on sloping lands, it is often necessary to do some earth-moving work such as gully filling and construction of contour banks, pasture furrows, and similar measures.

Any earth-moving work is most economical and satisfactory if done when the soil is in the right moisture condition. Soil conditions are generally suitable for most of the winter months but the fallowing period is the most likely time for farmers to fit this work into their farm activities. This will apply especially to farmers who have reduced their area of fallow in accordance with a soil conservation programme.

Farmers who have a system of contour banks planned and surveyed, but who are unable to do the job of bank construction in the winter months, should fallow a strip of 15 to 20 feet wide along the lines surveyed for the banks. This will ensure that the ground will not set too hard for the work to be done in the period between shearing and harvest, or even after harvest.

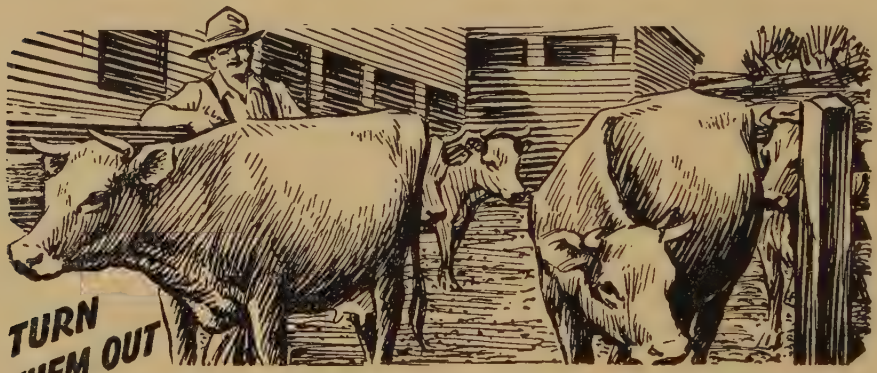
Greater agricultural production can be achieved without damage to our soils if suitable soil conservation practices are adopted. Soil conservation aims are to prevent erosion and maintain or improve soil productivity. Our goal should be to achieve production increase through greater yields per acre as well as by increased acreages. Advice from the Soil Conservation Service is available free to farmers and landholders, on matters relating to soil conservation and soil erosion control.

In some cases Service officers recommend the adoption of contour working, or the construction of contour pasture furrows, or systems of contour banks. These all require the surveying of lines on the land with suitable instruments, and in some cases farmers can undertake their own layouts. Surveying may also be done by Service officers and a charge is now made at the rate of £1 per hour for the time spent on the property while the surveying is in progress. This charge applies where one officer is involved and the farmers provide assistance. For a team of two officers to carry out surveys the charge is £1 10s. per hour.

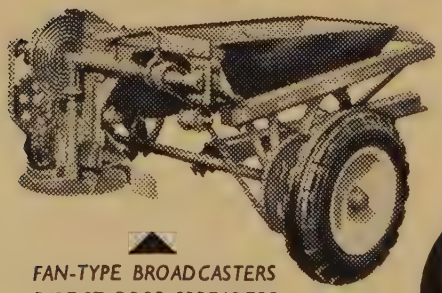
A REMINDER

HAVE you registered your orchard? One fruit tree or a single vine is an orchard for the purposes of the Plant Diseases Act and must be registered accordingly. The registration fee for less than one acre of trees or vines is 1s. Apply Department of Agriculture, Perth.

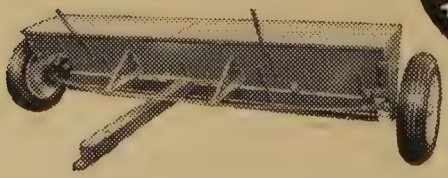
Make Your Milkers PRODUCE MORE!



TURN THEM OUT ON **CRUMP-*IMPROVED* PASTURES**



FAN-TYPE BROADCASTERS
DIRECT-DROP SPREADERS



Develop lush green pastures all year round. Raise healthier, higher-yield stock by topdressing with Crump Pasture Improvement Machines. The small capital outlay is often repaid from the first season's extra profits.

TOPDRESS WITH **Crump** PASTURE IMPROVEMENT MACHINERY

Ask NOW for full details from

KELLY & LEWIS (W.A.) PTY. LTD.

394 WILLIAM STREET, PERTH : B 7640

INSECT Pests AND THEIR CONTROL

by C. F. H. JENKINS, M.A. *(Government Entomologist).*

SNAILS AND SLUGS

BEFORE giving any details concerning these pests, it will be well to explain that slugs and snails are, of course, not insects. They have been included in this series of articles, however, because the damage they do resembles very much that done by various insects and because the lot of recommending control measures usually falls to an entomologist. The snail could more correctly be called a shellfish than an insect as it is a true mollusc, but one which has become adapted to a life on land instead of in the water.

DISTRIBUTION AND GENERAL DESCRIPTION

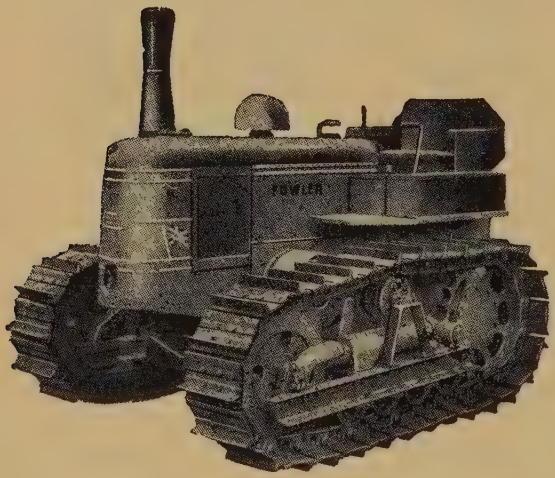
Two species of snails are common in this State, the Brown or English snail (*Helix aspersa* Müller), and the White or Italian snail (*Theba pisana* [Müller]). Slugs may be roughly described as snails without shells and as the habits and control measures described for snails will apply in the main essentials to slugs, they need receive no further mention.

The European snail reached this country many years ago, and is now practically world-wide in its distribution. The first record for Australia came from New South Wales in 1888, but the exact date of its arrival in Western Australia is not known. The White snail is a later arrival in this State and is believed to have been transported in ships' ballast from South Africa, where it is a well-known pest. Bunbury and Albany contend for the doubtful honour of being the first site where this snail was established locally. Its distribution at present is essentially coastal, and in situations where it is firmly established it far outnumbers the larger brown snail. So alarming was the rate of increase of this snail in portions of California that an extermination campaign was undertaken in 1922 and the results were eminently successful.

The Brown snail is the larger of the two species, the full-grown shell being formed of from four to four and a half whorls or coils and measuring an inch or more in diameter. The shell of the White snail may attain a diameter of from a half to three-quarters of an inch.

The food of the small snail consists both of living plants and dead or decayed vegetation, and they also show cannibalistic tendencies if any of their squashed brethren are available. The snail has no true jaws, but rasps its food by means of a tongue-like structure or radula covered with teeth like a file, the suitability of which for disposing of vegetable material few gardeners will question.

FIELD-MARSHALL



BRITISH
DIESEL TRACTOR

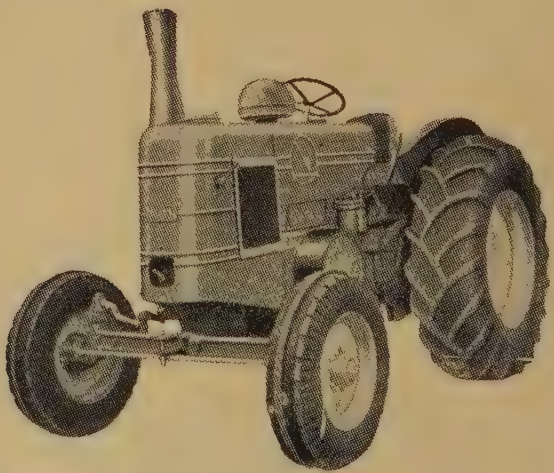
Series

3

FOWLER

MARK VF

BRITISH
DIESEL TRACTOR



Products of the Marshall Organisation, both the Field Marshall Series 3 and the Fowler Mark VF are powered with the famous Marshall single cylinder two-stroke diesel engine, which gives the greatest engine simplicity ever achieved with instant starting under all conditions, by means of a power cartridge. Six forward and two reverse speeds are available on both wheel and crawler models and fuel consumption averages one gallon and less.

SOLE WEST AUSTRALIAN AGENTS

WEST END MOTORS PTY. LTD.

1056 HAY ST., PERTH——————————B 8969, B 8630, BF 1408

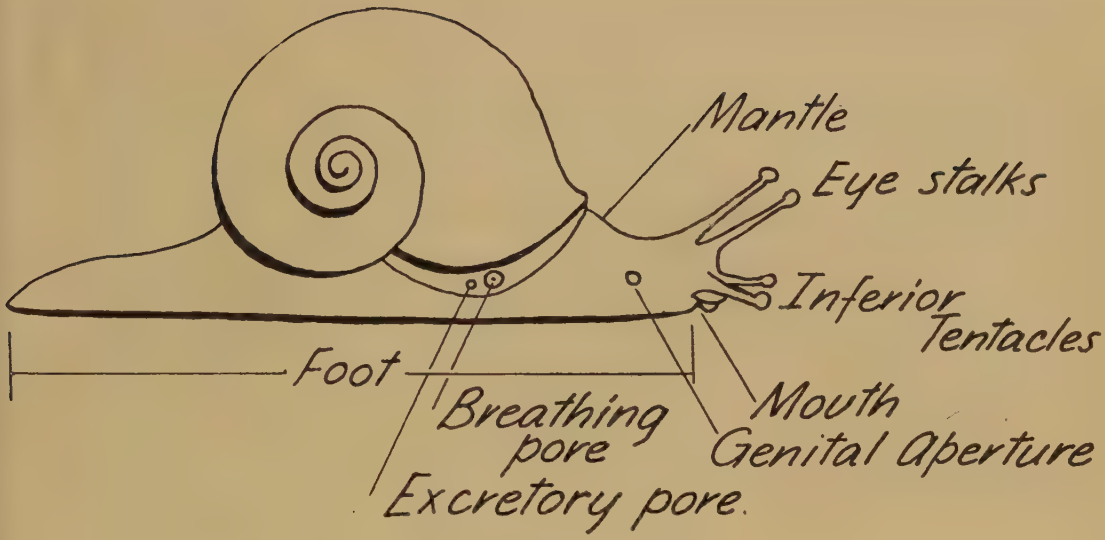


Fig. 1.—Diagram of a snail.

HABITS

The nocturnal habits of the Brown snails are well-known to all who have surveyed with dismay their surviving seedlings on "the morning after the night before." The White snail is not so retiring in its habits and may be found feeding in the day time.

The liking of snails for moisture and shelter is also general knowledge, and should be remembered when attempting control measures. Masses of weeds and tangles of creepers against walls and fences often provide harbourage for snails.

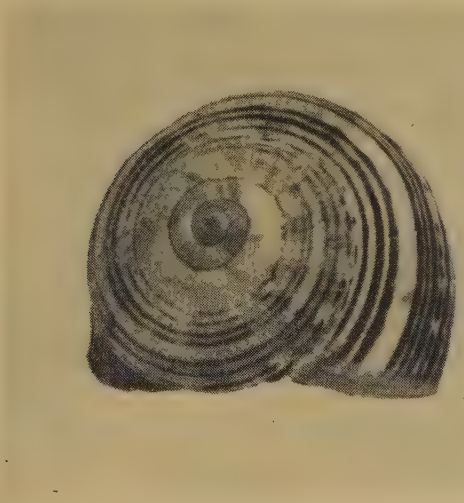


Fig. 2.—White or Italian Snail (about 2½ times natural size).

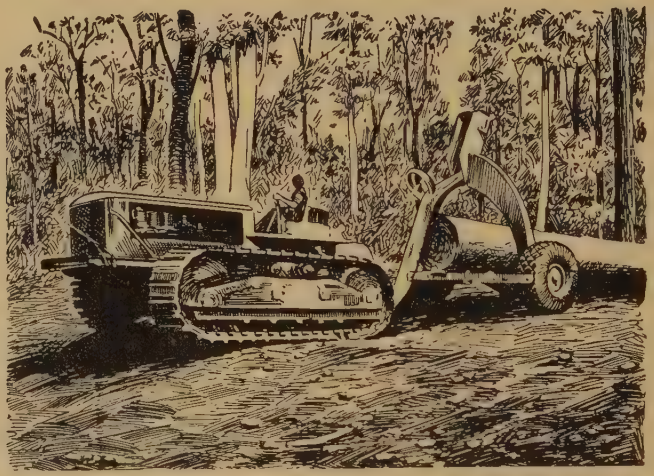
During adverse weather conditions, either dry or cold, the snail becomes inactive and seals off the entrance of its shell with a kind of diaphragm. Under our summer conditions this prevents excessive loss of moisture and enables the creature to survive even when exposed in clusters on twigs and fences.

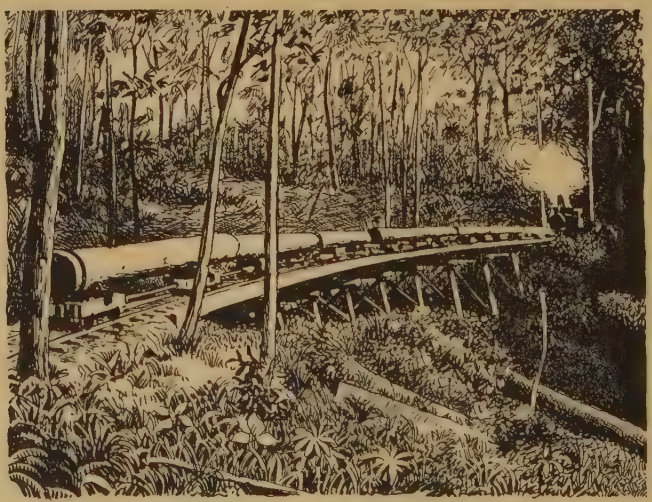
When this feature of the snails' habits is remembered there need be no astonishment at the sudden appearance, apparently from nowhere, of armies of snails immediately following the first autumn rains.

Experiments in South Africa showed that out of 50 snails of both species collected in January, 1919, and placed in jars of soil without food or artificial moisture six Brown and three White snails revived and fed on cabbage leaves at the end of March, 1921. That is after a dormant period of over two years.

When the shell of the snail becomes injured it can be repaired to a remarkable degree. New shell will be built over

STATE SAW MILLS AND BRICK-WORKS





SUPPLIERS OF—

Jarrah, Karri, Parana Pine, Baltic, Oregon, Pressed Bricks and all Builders' Hardware

Deliveries subject to stock being available and permits where necessary

Head Office:

306 MURRAY STREET, PERTH :: Tel. BA 2541

Joinery Works and Main Distributing Depot:

MILLER STREET, VICTORIA PARK :: Tel. M 2096

the places where sections have become detached, but the original markings are not reproduced, so that the repair work will always remain apparent.

At this stage perhaps it is appropriate to mention that, contrary to a rather popular belief, when a snail has been thoroughly squashed it is not able to survive, neither can any eggs it may contain continue to develop.

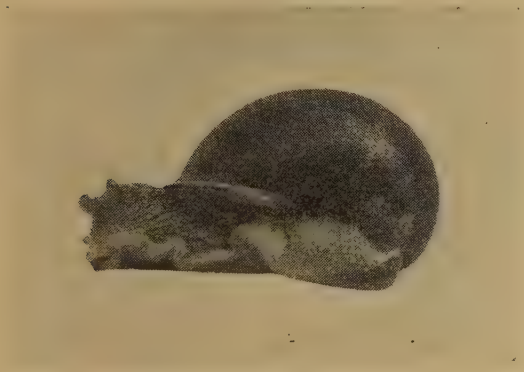


Fig. 3.—Brown or English Snail (natural size).

LIFE HISTORY

There is no differentiation of the sexes in snails, as each individual possesses the male and female organs, and so may be referred to as an hermaphrodite. During mating, mutual fertilisation takes place and both individuals may lay eggs. A suitable spot is selected in a damp, sheltered situation, and a hole about an inch or more in depth is dug. The eggs are coated with a slimy mucilage which causes them to cling together and swell when moistened. A single snail may lay a number of times and produce several hundred eggs. On hatching, the young snails are furnished with tiny white shells, and feed gregariously for some time, but when a few months old they lead a more individualistic life. The period required for the eggs to hatch is about a fortnight under good conditions, but this period may be greatly increased by dryness or excessive cold. The rate of growth is relatively slow, for it takes over a year for the full size to be reached.

CONTROL

Baits.—Metaldehyde mixed with bran has proved one of the most effective slug and snail baits yet devised. The poison may be obtained as a powder and sometimes also in the form of tablets sold under the name of "meta" fuel. Calcium arsenate is frequently recommended as an addition to snail bait to ensure that no individuals recover from the paralysing effect of the metaldehyde.

Recent investigations by New South Wales entomologists have shown that 10% BHC (Benzene-hexachloride) may also be used for this purpose.

The recommended formulas are:—

Small Quantity.

Metaldehyde	½ oz.
Bran or Pollard	1 lb.
Calcium Arsenate	1 oz.
or	
10% BHC	½ oz.

Large Quantity.

Metaldehyde	1 lb.
Bran or Pollard	30 lb.
Calcium Arsenate	2 lb.
or	
10% BHC	1 lb.

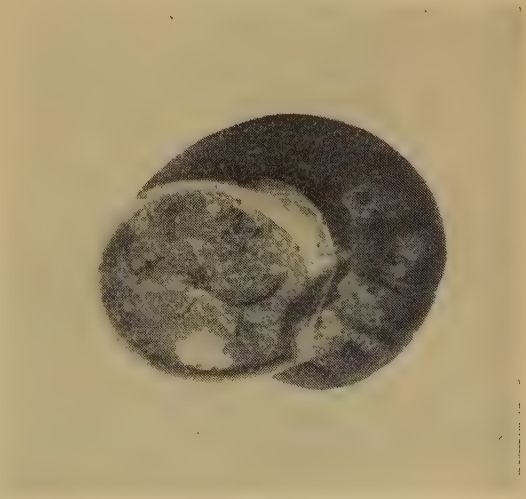


Fig. 4.—Brown Snail, showing seal across mouth of shell during the over-summering or aestivating period.

The baits should be thoroughly mixed and may be broadcast over the affected area or placed in small heaps near plants to be protected. The metaldehyde may burn some foliage and should not be liberally sprinkled on young seedlings. The addition of a small quantity of water to bran baits is sometimes adopted, but would be undesirable in pollard mixtures.

Where metaldehyde cannot be procured, the use of baits containing bran and calcium arsenate or even Paris green will give helpful results. The addition of two tablespoonsful of honey or treacle to the pound of bran is

Fig. 5.—Over-summering snails clustered on a bush at Spearwood.

recommended, and a small quantity of water should also be added to make a free crumbling mash.

Dusts.—Slaked lime is widely recommended for use against snails and slugs, but its efficiency leaves much to be desired. The addition of powdered copper sulphate (bluestone) or copper carbonate to the lime, however, makes a very toxic dust. This cannot be recommended for the actual treatment of plants, but where a plot of ground is endangered by invasions of snails from adjacent breeding grounds, a barrier of lime and copper dust will be found invaluable. Should the creatures succeed in crossing the barrier they will succumb very rapidly. The formula recommended is:—Copper sulphate or copper carbonate, 1 part; slaked lime, 12 parts. The efficiency of this mixture unfortunately deteriorates once the dust has become caked from wetting.

Sprays.—Copper sprays are particularly toxic to slugs and snails but as they may also burn plant foliage their use in a crude form can only be recommended on non-cultivated areas.

Bordeaux mixture on the other hand can be safely applied to most plants and a mixture widely favoured is 4 lb. of lime, 4 lb. of bluestone and 50 gallons of water. The addition of 1 gallon of white spraying oil and ½ pint of Black Leaf 40 or Nicotine Sulphate to the above mixture will increase the efficiency of the spray where quick results are required.

Home gardeners wishing to try sprays may, of course, make proportional reductions to the above amounts recommended for commercial growers.

Cultural Methods.—The importance of clean cultural methods cannot be overemphasised in the control of slugs and snails. Weed growth, hedges and accumulations of litter are favourable to snail activity and should be dealt with appropriately.

In the case of the White snail particularly, action during the summer may considerably lessen the damage to be experienced the following winter. The fact that the snails cluster on grass, weeds and shrubs during the dry months renders them very susceptible to fire and judicious burning off in paddocks and along road-sides may almost eliminate the danger of invasions when autumn rains commence. Where wholesale burning is not possible a break between "snail country" and cultivated plants should be made either by burning or cultivating. This will establish a bare strip over which the invading snails must pass and one which may be periodically treated with bait or spray whenever snail activity is noted.

KEEP YOUR JOURNALS

HERE at the production end, we are sparing neither expense nor effort in making the "Journal of Agriculture" a publication which will help you in your farming operations.

We suggest that the Journal is worth keeping and that a year's issue will make an attractive and useful volume for your library—a volume that is full of sound factual information, attractively presented.

Arrangements have been made for the compilation of a comprehensive index to be incorporated in the December issue—a feature which will greatly enhance the value of the Journal as a work of reference.

GOLDSBROUGH MORT
AND COMPANY LIMITED (INC IN VIC)

PERTH

and Branches and Agents Throughout the State

STUD STOCK and FAT STOCK SALESMEN

Stud Stock Sales annually at Royal Show and country centres. Fat Stock Sales at weekly metropolitan markets and regularly at country centres

WOOL, SKIN and HIDE BROKERS

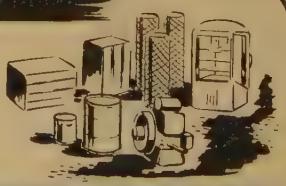
Consign yours to Goldsbroughs for inclusion in the next sale. Best results. Prompt returns.

WEST AUSTRALIAN FARMLANDS FOR SALE

We have continuous and numerous inquiries for Grazing and Dairying Properties in all districts . . . Send full particulars if you wish to sell

MERCHANDISE DEPARTMENT

A vast range of Merchandise for Farm or Station and Country Household use is available including Home Lighting Plants, Stationary Engines, Hot water Systems, Kerosene-heated Coppers, 32-volt Electric Appliances, Shearing Requisites, "Hexagam" Sheep Dip, Rabbit Baits, "Sternol" (British) Lubricating Oils, "Mag-o-tol" Blow-fly Repellant, "Top Form" Veterinary Remedies, "Phen-o-mort" for Worms in Stock, etc., etc.



VETERINARY DIVISION

Fully qualified Veterinary Officer, Mr. H. T. Carroll, B.V.Sc., H.D.A., is available to help you with your veterinary problems . . . Your requests for help promptly attended to

INSURANCE

Agents for Western Assurance Company

A NEW INSECT PEST IN W.A.

Oriental Fruit Moth (*Cydia molesta* Busck)

By C. F. H. JENKINS, M.A., Government Entomologist

IN recent weeks a new insect pest for Western Australia has been recorded. This is the Oriental fruit moth, sometimes known as the Oriental peach moth and the peach tip moth, both names indicating that peaches are the most susceptible of a wide variety of host fruits.

The insect has been established for many years in the Eastern States but no previous records have been made from this State. The native home of the moth is doubtful but it has been recorded from Japan, Italy, North America and Eastern Australia.

Prior to the advent of D.D.T., normal insecticide treatments were very unsatisfactory against this pest, although some degree of control was obtained with nicotine sulphate sprays. The use of 0.1% D.D.T. cover sprays during the growing season, however, have given good control in Victoria in recent years.

For the information of growers, the following notes concerning the life history and habits of the insect are made available.

DESCRIPTION

Egg.—The egg is small and greyish-white in colour and is mostly found on the under-sides of the leaves.

Larva.—The larva ranges in length from 1/16 inch to a little over ½ inch. In colour it is white with a black head and dark-coloured thorax when small, but as the larva increases in size it becomes pink or almost red.

Pupa.—The pupa is enclosed in a silken cocoon to which may adhere particles of bark, sand, leaves or other foreign matter.

Summer cocoons are more fragile than over-wintering ones and may be found on fruit, in axils of twigs, and under pieces of bark and other similar situations. Winter cocoons are usually found between branches or under the rough bark on the trunk.

A young pupa is yellowish-brown but gradually becomes a darker red in colour.

Adult.—The adult is a small greyish-brown moth with a wing span of about half an inch. Males and females are are similar in appearance and are most active about sun-set.

TYPE OF INJURY

(a) Twigs.—The larvae generally enter tender growing twigs and later two or three of the leaves wilt. Two to four year old trees seem most susceptible to attack and this is particularly true in well kept orchards with vigorously growing trees.

(b) Fruit.—There may be from one to six larvae per fruit and late ripening varieties are more susceptible to attack. The infested fruit usually ripens prematurely and some may drop.

Points of entrance are side entrance, stem entrance and invisible entrance.

(1) *Side Entrance.* — This usually takes place early in the spring and may be where two fruit are in contact, where

Fig. 1.—A. Newly infested peach twig showing one wilted leaf and pile of frass where the Oriental peach moth larva has entered. B. Infested twig split open to show channel and larva within. Considerably enlarged.

a leaf rests against a fruit or on the open surface of the fruit. Gum exudes from the point of entrance and this turns dark later, giving a distinct blotch at picking time.

(2) *Stem Entrance.*—This occurs by entry through the soft skin of the fruit around the stem, leaving a small pile of frass. It is easily overlooked and occurs in almost fully grown fruit.

(3) Invisible Entrance.—In this type of entrance there are no external signs of entry as the larva has entered through the fruit stem.

These three types of entry are found in peaches, side entrance being commonly used by the pest for other types of susceptible fruit.

Infested peaches, particularly late varieties, are frequently infected with brown rot near the entrance or exit holes of the larvae.

Injury to apples and pears is similar to that caused by codlin moth.

Growers in all districts are requested to watch carefully for this pest and to forward any suspect insects to the Department of Agriculture for identification.

CONTROL MEASURES

The control measures outlined are based upon those which have been found most effective in the Eastern States and abroad.

Chemical Control.—Prior to the advent of D.D.T. and the other "new insecticides," chemical control of the Oriental fruit moth was most unsatisfactory. Present indications are, however, that satisfactory control can be obtained from D.D.T. sprays.

Fig. 2.—A peach twig that has been infested for several days by the Oriental peach moth. Notice the dying back of the terminal leaves. Watch for this condition when pruning.

It is desirable to maintain an effective cover over the fruit from the time it is first susceptible till it is harvested. This may, therefore, mean a spray application about every four weeks. 0.1% water emulsions of D.D.T. are recommended.

Fruit Residues.—Tests in Victoria on peaches have shown that from three late applications of 0.2% D.D.T. the residue was 5.5 parts per million. 0.2% D.D.T. showed no significant control improvement over 0.1% which should leave much less residue.

Cultural Methods of Control:

1. Hessian or chemically treated corrugated cardboard bands should be placed around tree trunks.

Fig. 4.—A quince infected by the Oriental peach moth, showing exit holes.

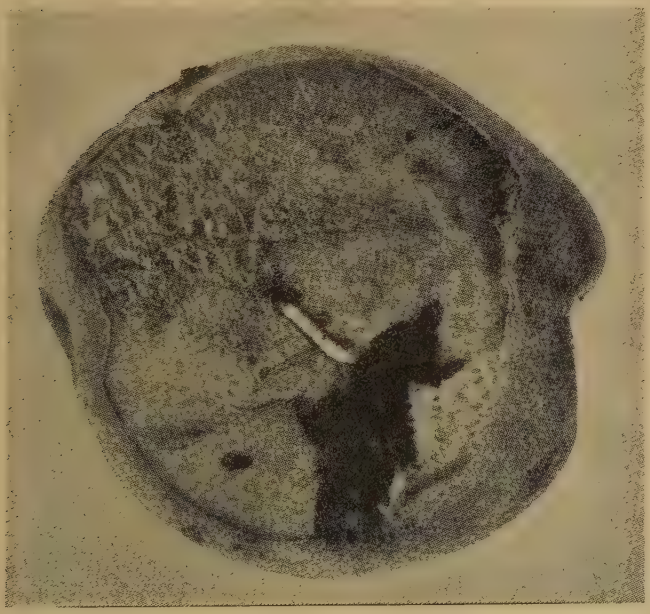


Fig. 3.—Work of oriental peach moth larva within a peach (enlarged).

2. Infested fruit should be destroyed by burning, boiling or deep burying.

3. Loose bark on the butts and main limbs should be scraped off and sheltering caterpillars and pupae destroyed.

4. Fruit tree props, wooden fences and similar harbourages close to trees may shelter caterpillars and pupae.

5. Infested terminal shoots should be removed and destroyed.

6. Deep cultivation in orchards in early spring has been found to bury the pupae in the soil and prevent the emergence of moths.

Going forward together

Proud emblem of one of Australia's leading secondary industries, the Lysaght house flag takes its place alongside the national flag of the Commonwealth as a symbol of the Company's determination to 'grow with Australia.' Huge sums have, in fact, already been spent by the Company in the modernisation of its various factories at Newcastle and Port Kembla, and new mills are now in course of erection that will not only *double* the Company's output within the next few years but make 'Lysaght's' the most modern sheet steel manufacturing organisation in the world!

LYSAGHT

"Growing with Australia"

John Lysaght (Australia) Pty. Ltd. SYDNEY, MELBOURNE, BRISBANE, ADELAIDE, FREMANTLE

INCUBATOR HYGIENE

An Important Factor in the Control of Hatchery Diseases of Chickens

By
J. E. PETERSON, Veterinary Pathologist
and
A. R. WRIGHT, Poultry Instructor

THE rapid expansion of the poultry industry is due in no small measure to the introduction of the cabinet type of incubator. However, the widespread use of these machines in which large numbers of chickens are confined, for a period, to a very small space, has also favoured the spread of many diseases, and unless steps are taken to prevent the introduction of these diseases to the newly-hatched chickens disastrous losses are likely to occur.

Pullorum, salmonellosis and omphalitis are the bacterial diseases of young chickens most frequently associated with hatching, but by taking suitable precautions, as outlined in this article, losses from these conditions can be virtually eliminated.

PULLORUM DISEASE

One of the most serious diseases to be contended with in the poultry industry is pullorum disease, with its extremely heavy mortality in young chickens and reduced productivity in laying hens. The disease is transmitted through the egg, and the hatching of one infected chicken results in the scattering of infective fluff and dust throughout the whole of the hatching compartment. As a result, practically the whole of the hatch may become infected and die.

Pullorum-infected eggs come only from infected hens and these birds can be detected by the pullorum blood-test. It therefore follows that if eggs for hatching are obtained only from flocks in which pullorum disease has been eliminated by the use of this test and the destruction of positive reacting birds, then risk of outbreaks originating in the incubator becomes negligible.

Because the causal organism of this disease is actually within the egg it is useless to attempt to control it other than through elimination of infected hens. Disinfection of the incubator will prevent the disease being carried over from one hatch to the next, but it will not prevent its occurrence in a hatch containing infected eggs.

SALMONELLOSIS

This disease can be caused by a number of related organisms but for practical purposes of control all can be considered alike. Only occasional outbreaks have been known to occur in this State.

Like pullorum disease, salmonellosis can be transmitted through the egg, but more commonly the organisms are found on the shells of eggs from infected birds which eliminate the organisms in their droppings. Unlike pullorum, however, there is no really satisfactory method of

INCUBATOR FUMIGATION

Fig. 1.—Preparing the fumigants. The bottle contains formalin and the large container on the right holds permanganate of potash. The operator is placing permanganate into the receptacle to be used for mixing the fumigants.

Fig. 2.—A measure of formalin has been added to the permanganate and fumes may be seen rising. This was done for demonstration purposes only. In practice, the mixing would be done in the incubator so that none of the fumes would be wasted, and a porcelain receptacle would be preferred to the tin.

Fig. 3.—Illustrating the actual fumigation of the setting compartment while the eggs are in the machine. Formalin is about to be added to the permanganate in the tin.

detecting infected hens, so control must be principally through disinfection of contaminated eggs after they have been selected for incubation.

Should an outbreak occur in newly-hatched chickens then proper disinfection before the next hatch is due will prevent the further spread of the disease, as with pullorum.

Salmonellosis may infect animals as well as birds. Rats and mice may be sources of infection. Where trouble is experienced with this disease, vermin control may assist considerably in preventing further outbreaks.

OMPHALITIS (Navel Disease)

Caused by a variety of bacteria, this disease is rather different from those already mentioned. It is generally understood to be due to infection through the unhealed navel soon after hatching, although there is some evidence that egg transmission is also possible. The disease is more likely to occur when hatching takes place in soiled or dirty compartments which have become heavily contaminated. Although infection only occurs during a short period, losses may be quite severe.

PREPARATION OF EGGS FOR INCUBATION

Only clean eggs should be used for incubation. Soiled eggs may cause heavy bacterial contamination of the incubator and lead to an outbreak of disease.

If circumstances force the use of soiled eggs they should be properly cleaned before setting.

Washing eggs in water or with a wet cloth may assist bacteria to penetrate the shell and may spread contamination from egg to egg. Gross dirt should be removed from the shell while dry by rubbing gently with steel wool.

Storage of hatching eggs should be for as short a period as possible. A cool atmosphere is essential both to maintain quality and to minimise the risk of shell penetration by bacteria.

PREPARATION OF INCUBATOR

It is assumed that at the commencement of the hatching season the incubator is reasonably clean. Nevertheless it should be thoroughly disinfected before the first batch of eggs is set.

If the machine contains dust, this may be removed with a vacuum cleaner and the whole interior is then washed down thoroughly with disinfectant after making sure that all solid particles of dirt and shell have been scraped off the surface of walls or trays. The trays should be washed in hot water and then soaked in a bath of disinfectant for about 12 hours.

Such disinfectants as lysol, Dettol, 5 per cent. or 10 per cent. formalin in water and hypochlorite solutions are all quite satisfactory, although formalin is rather unpleasant to use. Steam under pressure is effective if available.

Remember that few disinfectants are effective against bacteria encased within solid masses of grease, dirt or droppings. Hence the need for very thorough cleansing before the final disinfection.

All dirt, sweepings, fluff, etc., from incubators should be burnt to prevent contamination of buildings or yards.

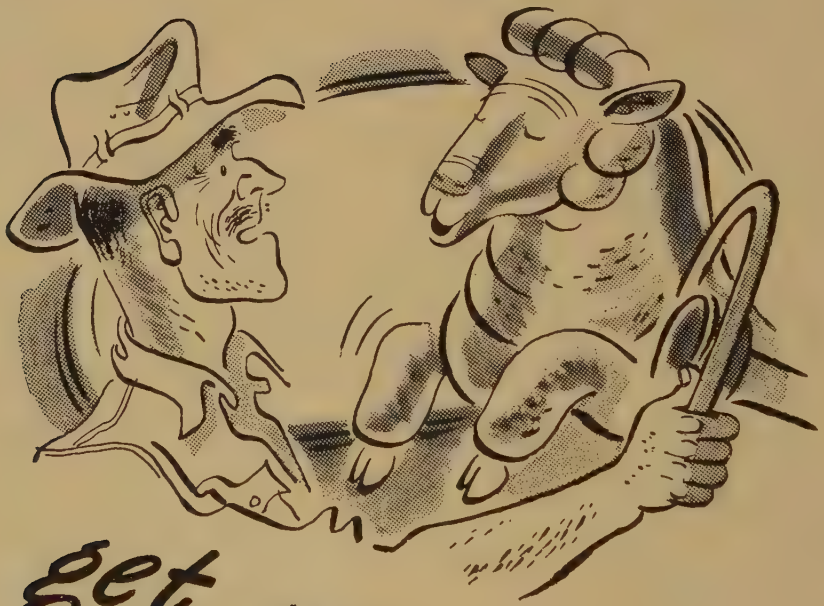
After this preliminary disinfection has been completed the machine can be assembled and switched on for checking before incubation commences. At this stage it is well to take the opportunity of giving a final disinfection, by fumigating with formaldehyde gas according to the instructions set out below.

Spraying of the walls and floors of the incubator room with a disinfectant will reduce the risk of re-contamination of the interior of the incubators when the doors are opened.

DISINFECTION DURING INCUBATION

Once the incubator has been loaded with eggs all subsequent disinfection is by fumigation with formaldehyde.

don't forget...



get my

'PHENOVIS'

THE OUTSTANDING WORM REMEDY

ICI

IMPERIAL CHEMICAL INDUSTRIES
OF AUSTRALIA AND NEW ZEALAND LIMITED

PHE.8.X.1017

BLOOD TESTING TO DETECT PULLORUM DISEASE

Fig. 1.—Tester dropping antigen on to glass slide.

Fig. 2.—Taking blood from the vein on the underside of the fowl's wing by means of a needle with wire loop attached.

Fig. 3.—A small quantity of blood is transferred from the loop to the prepared slide which is placed on a water-heated oven for 1½ to 2 minutes.

Fig. 4.—Reading the test slides. In the case of a bird infected with pullorum disease, the test shows the micro-organisms which cause the disease clumped together, or agglutinated, in the mixture of blood and antigen. No "clumping" takes place if the blood is from a pullorum-free bird.

Fig. 5.—After the blood samples are taken, the birds are placed in separate numbered compartments in the holding crates. Crate numbers coincide with slide numbers so that when the tests are completed, any positive reactors may be isolated for slaughter and pullorum-free birds returned to the flock.

It is desirable that the first fumigation should be carried out within a few hours of setting in order to destroy any bacteria contaminating the shells of the eggs. Penetration of shells, with consequent infection of the embryos and contamination of the incubator is thus minimised.

In machines where hatching takes place in the same compartment as the incubation it may not always be possible to fumigate at the correct time if setting and hatching dates coincide. In such cases the eggs can be fumigated in a separate box before they are put in the incubator. Under these circumstances fumigation is best carried out at ordinary room temperature and humidity, especially if a few days are to elapse before incubation commences.

This fumigation procedure must be carried out with every new batch of eggs that is set. As setting often takes place at twice-weekly intervals in large machines it means that each batch of eggs is fumigated six times during incubation. This six-fold treatment will give considerably greater protection than a single treatment, which, in practice, cannot be relied on to give absolute destruction of every contaminating organism.

In small incubators where only one hatch at a time can be accommodated it is advantageous to fumigate about six to eight hours after setting and again towards the end of the incubation period, say between the 15th and 18th days.

Immediately following and at the completion of the hatch a thorough cleaning is necessary to remove all fluff, shell fragments and droppings, which must be regarded as a source of infection. It is well to remember that if a pullorum-infected chicken hatches, the whole compartment will be contaminated, and there is every possibility that many chickens in the batch will become infected although signs of infection may not commence to show up in the batch for several days.

THE DANGER PERIOD FOR FUMIGATION

Fumigation should not be carried out between the 24th and 96th hours after setting. During this period the susceptibility of the embryo to adverse conditions is greatest and fumigation is likely to cause some mortality.

Outside this critical period, fumigation can be carried out at any time. It is sometimes carried out after hatching has commenced, but there is no particular advantage in this practice and it is certainly not advisable once the chickens have commenced to dry out.

FUMIGATION METHODS

It is recommended that incubators be fumigated with formaldehyde gas. Formaldehyde is obtained as a 40 per cent. solution in water, known as formalin. The gas can be produced from this solution by (a) simple evaporation or (b) by mixing with potassium permanganate.

(a) In the former method, pieces of cheese-cloth about one yard square are soaked in the required amount of formalin (40 c.c. or approximately 1½ fluid ounces per 100 cubic feet of incubator space). These are then hung up near the fan so that evaporation takes place in a few minutes. In actual practice this method does not seem to be quite as efficient as the following alternative method which depends on the rapid generation of formaldehyde gas when formalin is mixed with potassium permanganate.

(b) For routine fumigation use 75 c.c. 2¾ fluid ounces) of formaldehyde and 50 grammes (1¾ ounces) of potassium permanganate per 100 cubic feet of incubator space. The fumigation should be continued for 30 minutes.

If an outbreak of disease occurs in the chickens it would be advisable to use a much larger amount of gas for at least one fumigation. For this, 150 c.c. (5¼ fluid ounces) of formalin and 100 grammes (3½ ounces) of potassium permanganate are recommended per 100 cubic feet.

It is desirable that the period of fumigation be as long as possible.

It has been demonstrated that even the largest amount of gas mentioned above has no significant effect on hatchability when fumigation is prolonged for 30 minutes, provided the eggs do not already have some inherent fault such as weak germs and providing they have not been stored for a long period prior to incubation. In these latter cases the death rate of the embryos is increased somewhat.

The exact amount of each ingredient should be used. To use an insufficient amount of potassium permanganate means that the full amount of gas is not produced, while an excess of potassium permanganate is merely wasteful as it is not used.

TEMPERATURE AND HUMIDITY

For efficient management of incubators the operator should be familiar with the use of wet bulb thermometers which are used in conjunction with the ordinary dry bulb thermometer to determine relative humidity.

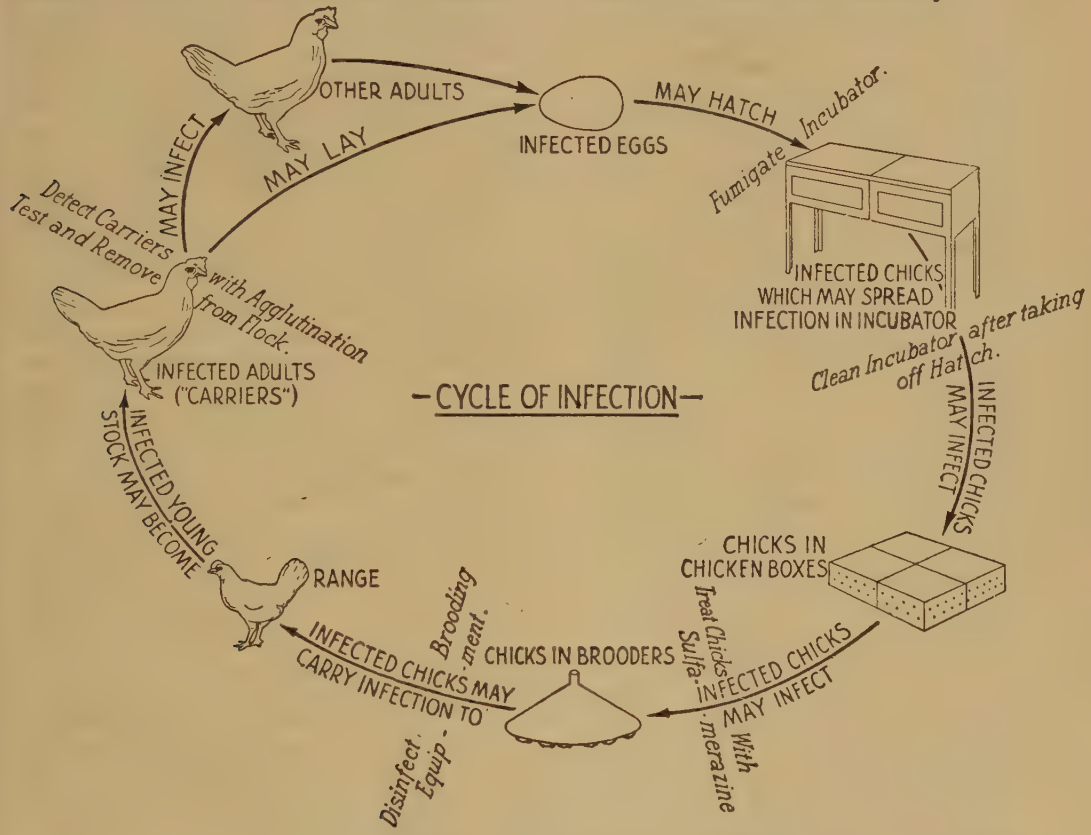


Diagram showing cycle of infection of Pullorum Disease and Control Measures recommended.
[Adapted from Biester and Devries.

Fumigation is best carried out at a temperature of about 100°F. A high degree of humidity is desirable within the incubator for best results. During fumigation the relative humidity should be at least 68 per cent. This degree of humidity is obtained when the dry bulb thermometer reads 100°F. and the wet bulb thermometer reads 90°F.

In most large machines, closing the vents is all that is required to increase the humidity. In others it may be necessary to add additional water either

in trays or by placing wet bags on the incubator floor. These should be removed as soon as the fumigation has been completed.

PROCEDURE FOR FUMIGATION

1. Calculate the size of the inside of the incubator making no allowance for space occupied by eggs or trays. To do this, measure the length, breadth and height of the interior of the compartment in feet and multiply the three figures together.
2. Measure out the proper quantities of formalin and potassium permanganate according to the size of the incubator. It may be more convenient to have these amounts put up by the chemist from whom they are purchased.
3. Place the potassium permanganate in a wide china, earthenware or enamel basin. This should be sufficiently wide and deep to prevent splashing as some frothing occurs when the two ingredients are mixed. The bowl is then placed in a level position on the floor of the incubator, near the door.
4. Close the vents and bring the temperature and humidity to the correct levels for fumigation (dry bulb 100°F., wet bulb 90°F.).
5. When both temperature and humidity are correct shut off the motor, open the door, add the formalin to the potassium permanganate in the basin, close the door and turn the motor on immediately.
6. Allow the fumigation to proceed for the appropriate time (say 30 minutes).
7. Remove the bowl containing the used material, leave doors and vents open and run the motor for about five minutes to get rid of the formaldehyde.
8. Shut doors and return machine to its normal setting.

The above instructions are written primarily for large forced-draught machines and some adaptation may be required for use in smaller incubators. In still-air models considerable variation is likely to occur in the concentration of gas in different parts. For this reason the amounts of formalin and potassium permanganate should be increased slightly in order that the maximum lethal concentration will be obtained throughout.

Unlike forced-draught machines the hot-air types have a different system of ventilation and as these systems vary considerably according to the make and size of the machine, it is essential that all ventilators be closed while fumigation is being carried out. The temperature of hot-air machines should be maintained at 103°F. and the wet bulb at 93°F. during the fumigation period.

Internal Sizes of some Commonly used Incubators

1. "Lanyon" still air, 120 egg capacity: approx. 2 ft. x 2 ft. x 1 ft. = 4 cubic feet.
2. "Multiplo" 1,350 egg capacity: 3 ft. x 2½ ft. x 4 ft. = 30 cubic fet.
3. "Gamble" 4,000 capacity—
   (Setting compartment) = 3 ft. x 5 ft. x 5¼ ft. = 79 cubic ft. (approx.).
   (Hatching compartment) = 3ft. x 2½ ft. x 5¼ ft. = 39 cubic ft. (approximately).

Estimation of Ingredients Required for Fumigation

Example:

Inside measurements of incubator: 3 ft. x 6 ft. x 5 ft. = 90 cubic ft.

Using 75 c.c. formalin and 50 grammes potassium permanganate per 100 cubic feet 90 c. ft. = 9/10 of 100 c. ft.

Amount of formalin required = 9/10 x 75 = 67.5 c.c.

Amount of pot. permang. required = 9/10 x 50 = 45 grammes.

Note.—To convert c.c. to fluid ounces or grammes to ounces divide by 30. This will give an approximately correct result, e.g., 75 c.c. = 75/30 = 2½ fl. oz. (approx.).

Ingredients required for incubators of various sizes, using 75 c.c. formalin and 50 grammes potassium permanganate per 100 cubic ft. (if 150 c.c. formalin and 100 grammes potassium permanganate are used, double these quantities will be required):—

Incubator space.	Formalin required.	Pot. permang. required.
4 cubic ft.	3 c.c.	2 grammes
30 „ „	22.5 „	15 „
40 „ „	30 „	20 „
80 „ „	60 „	40 „
120 „ „	90 „	60 „
175 „ „	131 „	87.5 „

In conclusion, it must again be stressed that fumigation is only one step in the control of hatchery diseases.

Emphasis must be placed on efficient pullorum testing of adult poultry as the main line of defence. Good all-round poultry husbandry will effectively reinforce these measures.

WHITE CABBAGE BUTTERFLY

Parasitic Moths Released.

DURING January a consignment of small wasps which parasitise the white Cabbage Butterfly were received in this State from the C.S.I.R.O., Canberra, and were released on cabbages in the Coogee area.

The Government Entomologist (Mr. C. F. H. Jenkins) stated that since the White Cabbage Butterfly was first recorded in this State in January, 1943, three different species of wasp parasite had been released and were contributing to the control of the butterfly. The White Cabbage Butterfly in its larval form caused tremendous damage to plants such as cabbages and cauliflowers unless control measures, usually in the form of dusts, were applied.

It was difficult to estimate the degree of control achieved biologically by means of the wasps but there was always hope that a particularly favourable set of conditions would help the parasites to destroy large numbers of the caterpillars. The wasps laid their eggs in the bodies of the caterpillars, just prior to the chrysalis stage being reached and this meant that a number of young wasps emerged from the chrysalis instead of the adult butterfly.

TREES OF WESTERN AUSTRALIA
and
POISON PLANT SERIES

OWING to the absence from Perth of the Government Botanist (Mr. C. A. Gardner), we regret that the drawings and letterpress for the series, "Trees of W.A." and "Poison Plants of W.A." were not available in time to be included in this issue.

Mr. Gardner has been in the Kimberleys, carrying out investigations into plants suspected of causing "Walkabout Disease" of horses, but should be back in time to continue his series of articles in the July-August issue of the "Journal."

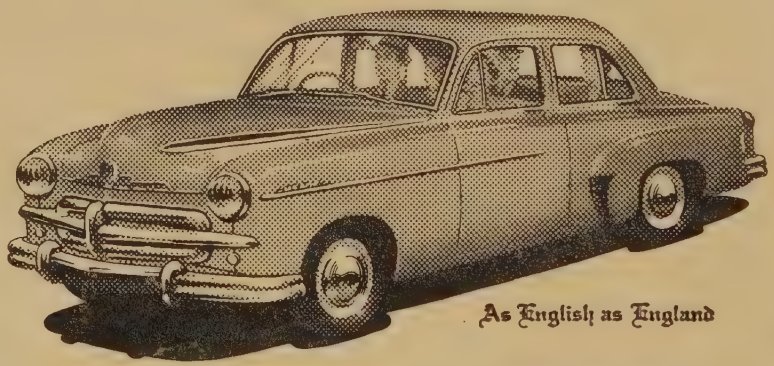
THE EDITOR.

HAVE YOU SEEN

the two exciting new

VAUXHALLS

12 H.P. WYVERN AND 18 H.P. VELOX



Longer, wider, roomier, lovelier, than ever before . .

The 2 new Vauxhall models with the flush-sided body design, are exciting enthusiastic praise everywhere. Both models are alike in dimensions and styling but so different in driver appeal. For outstanding economy with truly surprising performance, the thrifty 12 h.p. 4-cylinder Wyvern is for you. While for flashing top-gear performance and worthwhile economy the 18 h.p. 6-cylinder Velox has no peer. Completely new suspension front and rear provides exceptional road holding. Ask your local Vauxhall dealer for details.

OUTSTANDING FEATURES OF THESE BEST EVER VAUXHALLS

All-steel welded integrally constructed Saloon body, of new and advanced design.
Single-piece bonnet opens either side.
Three-speed gearbox, Vauxhall controlled synchromesh on top and second.
Completely new suspension system . . . Independent front wheel springing of coil and wishbone type. Long, extra-wide leaf type semi-elliptic springs at rear.
New Hypoid rear axle more robust, quieter and smoother in operation.
G.M.A.C. Confidential Payment Plan . . . Ask your Dealer to explain the G.M.A.C. Confidential Payment Plan.
"AIR CHIEF" CAR RADIO . . . There's an "Air Chief", Australia's finest car radio, specially designed for Vauxhall.

Full 5-6 Passenger Seating . . . Both Vauxhall Velox and Wyvern with increased wheelbases and tracks give spreading comfort for five or six . . . space for a full load of holiday luggage . . . better riding and safe, sure handling.

VAUXHALL

4-Cyl. Wyvern — 6-Cyl. Velox

General Motors-Holden's Ltd.

Metropolitan Distribution:

ATTWOOD MOTORS PTY. LTD.

22-32 Stirling St., PERTH ... ... Telephone BF 1211

or buy from your local authorised Dealer.

Sold and serviced by Vauxhall Dealers throughout Australia. VE3/24NP

The Cultivation of the Cape Gooseberry

By ROY L. CAILES,
Horticultural Instructor

THE Cape Gooseberry (Physalis peruviana) is a member of the large family Solanaceae, which includes the potato, the tomato and the capsicum. The plant is a native of Peru and Chile, where the species is known to have been cultivated for over two centuries. Records show that by 1807 it had been introduced into the settlement at the Cape of Good Hope, and shortly afterwards found its way to New South Wales, where it became known as the "Cape Gooseberry," and was the chief fruit that the colonists cultivated at that time. Cape Gooseberries have been grown for many years in Western Australia where the long summer is conducive to the growth and fruitfulness of these plants provided that summer moisture is available.

The plant is a spreading herbaceous shrub which grows to a height of up to three feet, with a spread of up to five feet. The leaves are broadly heart-shaped with a profusion of soft hairs on both surfaces. Light yellow, open bell-shaped flowers are borne profusely.

The berries when ripe, are yellow, firm and juicy with numerous small flattish seeds embedded in the flesh. A light papery husk, which is easily detached encloses each berry. The fruit may be eaten fresh, but more often it is used for culinary purposes, as cooking enhances its delicious sub-acid flavour.

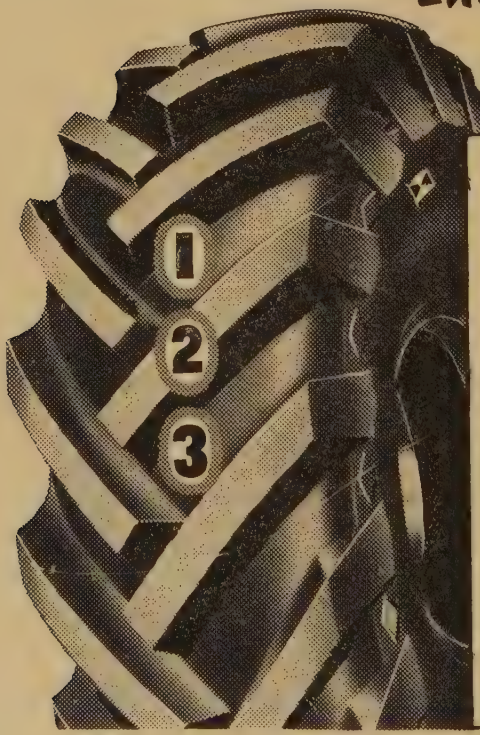
PLANTING

Cape Gooseberry plants are easily raised from seed sown in boxes or seed beds, by methods similar to those used for tomatoes. In practice, some variation occurs in the time of sowing. Seed may be sown either in early autumn (March-April), or later in June, where suitable shelter can be provided Plants must be raised early enough to make strong roots, and have strong sturdy crowns, for planting out in the field in late September, or early October (for late districts). Once established the plants are fairly resistant to frost, while they are hardy enough to withstand the long dry summer.

The Cape Gooseberry will thrive only in well-drained soils. Land with a gentle slope is most suited for planting, because of natural drainage. On flatter ground some form of artificial drainage is necessary and this may be accomplished by ridging when ploughing prior to planting. By setting out the plants at the required distances apart along the ridges, and later when cultivating, throwing the soil up to the plants, sufficient drainage can be achieved.

1 2 3 reasons why it's FIRST WITH FARMERS

ONLY SURE-GRIP GIVES ALL-THREE EXTRA TRACTION FEATURES



1 **O-P-E-N C-E-N-T-R-E TREAD.**
Famous Goodyear o-p-e-n c-e-n-t-r-e tread provides self-cleaning action. The result is less slip, maximum traction—far longer life.

2 **STRAIGHT LUG BARS.**
Lugs extend straight across tyre's crown—don't curve towards direction of travel. So, you get full-lug pull—"the greatest pull on earth!"

3 **WEDGE-LIKE GRIP.**
Lugs are set closer together at shoulder than at tread centre to give a wedge-like grip and PULL—where other tyres don't.

from **GOODYEAR**

SURE-GRIP TRACTOR TYRES

YOU GET "THE GREATEST PULL ON EARTH"

10B9-24

In planting allow at least seven feet between plants and between rows to give sufficient space for their normal spread of between three and four feet. Use should be made of farmyard manure, straw litter or similar organic material, which will conserve moisture and at the same time, tend to enrich the soil. The plants also benefit from a dressing of ½ lb. of potato fertiliser or orchard fertiliser per plant in September.

During the spring and early summer, light cultivation should be given to check weed growth.

The Cape Gooseberry plant is a perennial by nature and will persist for three or four years. For commercial use, it is better treated as an annual; seedling plants being raised each season and set out later in new ground.

Throughout the summer months, sufficient moisture must be present, to keep the plants in active growth. If the soil becomes dry the plants will revert to a dormant state. Where it is possible to irrigate, fruiting will commence in early summer with a peak in production in February and Macrh. In the absence of irrigation, the Cape Gooseberry is sometimes allowed to persist in a semi-dormant state during the summer; new growth commences in the autumn with the advent of seasonal rain. Under these conditions payable crops are produced from July to October. Fruit harvested at this period, brings the highest price.

PESTS

Cape Gooseberry plants are subject to attack by caterpillars of the potato moth which tunnel into the stem of the plant causing wilting of the leaves on the infected branches. The pest is likely to be troublesome on land which has been recently used for potatoes and for this reason such situations should be avoided.

Red spider may also attack Cape Gooseberries. Infestations usually occur about mid-summer and cause a yellowing of the leaves and sometimes defoliation.

For the control of both these pests leaflets dealing with the subject are available and should be consulted.

HARVESTING AND MARKETING

The fruit is gathered for market when the husk turns light brown, and the berry is clear yellow. It is usual for many fruits as they ripen to fall beneath the plants. The fallen fruits are gathered and sorted out by culling those showing discoloured husks; usually a sign that the berry has broken down. Some care is necessary in using fruits which are gathered during the late winter and spring months, because of frequent rain. All fruit should be dry before packing to prevent sweating in the container. If rain has occurred near the time of gathering, the fruit should be set out in the sun before packing.

The half dump case holding approximately 15 lb. is preferred for sending Cape Gooseberries by rail to the metropolitan markets. Small open-meshed sacks holding from 15 to 20 lb. are in general use by Hills Districts and metropolitan growers and have proved very suitable for market requirements. When packing, considerable pressure can be applied without injury to the berries, because of the protection afforded by the husks.

Market prices vary in accordance with the time of the year although there is at all times a good demand for this fruit. When the market is well supplied, in February and March, the average price is usually in the vicinity of 1s. per lb. while during the July-October period, prices range from 1s. 3d. to 1s. 9d. per lb. There is also a demand for factory fruit at remunerative price.

The keenness of the demand for Cape Gooseberries, warrants greatly increased plantings and extension of plantings can be recommended with confidence.

C.S.M.L. LIME SULPHUR SPRAY

Sulphur Content 28 per cent. (By Volume of Soluble Sulphur)

AVAILABLE FOR COMING SPRAYING SEASON

— in —

5-Gallon and 44-Gallon Drums (New)

— or —

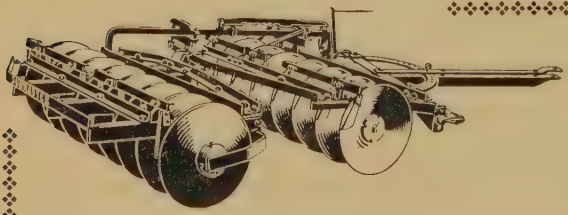
44-Gallon Drums Supplied by Customers

in good order and condition

Inquire through Manufacturers—

Cuming Smith & Mt. Lyell Farmers' Fertilisers Limited

135 St. George's Terrace, Perth :: :: Or any of our Distributors



SUNMASTER

THE NEW SUNSHINE

OFFSET TANDEM DISC HARROW

FOR ORCHARD, VINEYARD, GRAIN AND GENERAL CULTIVATION

The SUNMASTER is made in four basic sizes, with patented extensions a full range of 10, 12, 14, 16, 18, 20, 22 and 24-disc sizes is provided

10 Disc	cuts 3ft. 9in.	12 Disc	cuts 4ft. 6in.
16 Disc	cuts 6ft.	20 Disc	cuts 7ft. 6in.

The SUNMASTER is scientifically designed, built better. It is strong and rigid, but comparatively light

For any further information, see your local Sunshine Agent, or write direct to

H. V. McKay Massey Harris Pty. Ltd.

Corner MURRAY & KING STREETS, PERTH :: Warehouse: MAYLANDS

THE FARM BREAKFAST

By H. M. GLOSTER

MOST modern farmers go to considerable trouble to ascertain the dietary requirements of the livestock on their farms and try to provide the recommended quantities of each nutrient as set down by skilled advisers on animal nutrition. They carefully study each animal, and on the slightest sign of loss of condition, immediately seek expert advice and lose no time in remedying any deficiencies in the diet.

It is regrettable that in many homes, both in the country and in the cities, the family diet does not receive more than a fraction of this consideration. The common tendency is for the housewife to be swayed too much by what the family "likes," and too little by its real needs.

In a country like Australia where a wide range of foodstuffs is available at prices well within the average income, it is amazing to find that 13.3% of children in metropolitan and 11.7% in country schools were suffering from under-nutrition in 1950, and that this condition was on the increase, as the figures for 1949 were 9.1% and 10.1% respectively.

It is a matter for serious concern that more than one child in every ten in this State are in need of a more satisfactory diet, and the onus is on every housewife to study the dietary pattern of her particular household and gradually introduce adjustments where they are needed.

There are 10,000 country children travelling to school daily by bus in this State and to this number may be added a further group of children who travel

considerable distances by private conveyance. Each one of these children leaves home early in the morning, has a cold packed lunch at school and has his or her main meal for the day in the evening.

The majority of city children, similarly, have packed lunches at mid-day and dinner at night.

It is recommended that mothers of families should make a careful study of the breakfast fare and do all that is possible to ensure that every member of the family eats an adequate and satisfying breakfast to provide a good basis for the day's activities. The breakfast menu should provide:

(a) Foods which provide energy. These requirements are obtained mainly from cereals (starch), sugar and fatty foods.

(b) Body-building foods. At breakfast these are mainly provided by eggs, fish, meat and milk.

(c) Protective foods, or the foods which maintain the tone of the body and ensure that the various bodily functions are in proper working order. These needs are supplied by the foods containing ample supplies of minerals and vitamins. To these may be added food containing sufficient roughage or bulk to keep the bowels properly regulated.

(d) Sufficient liquids to keep the bodily processes functioning satisfactorily.

In planning breakfasts the housewife should endeavour to select foods from the chart on the next page and include some from each column in the meal.

In terms of complete meals this may be interpreted as follows:—

On rising—a glass of warm water.

Breakfast—A plate of porridge with treacle or sugar and milk according to taste, followed by a cooked dish containing ample protein or body-building foods such as eggs, fish, meat or meat offal. This dish should be accompanied by wholemeal toast, or bread and butter if liked and suited to the dish.

A milk drink or a food cooked in milk together with some fruit would round off the meal satisfactorily.

For the growing child, or for the adult engaged in heavy manual work, toast and butter with marmalade or honey may be used to supplement the above.

A piece of fruit should be eaten last as crisp, fresh fruit will help to clean the teeth and lessen the chances of decay.

A point worth emphasising also is that the household arrangements should be such that they allow for breakfast to be eaten in a leisurely manner. Hurried meals cannot be satisfactorily chewed and digested.

The breakfast pattern in far too many modern homes consists of a cold cereal with milk and sugar, some toast with butter and marmalade and a cup of tea. This is a meal which can be prepared quickly and easily. It appeals to the modern palate and is satisfying as it consists largely of energy food.

Its disadvantages are that from the nutritive point of view it is unbalanced and expensive. The milk served with the cereal provides most of the protective value of the meal but where the household budget has to be considered, porridge will be found much cheaper and far more nutritious.

PORRIDGE

Porridge is made from ground or flaked whole grain and its nutritive value is not lost in milling or in precooking as is the case with many prepared cereals. Of the various types of grain meal which can be purchased, oatmeal has the highest nutritive value, and it is easy to prepare and may be served with milk and sugar. Treacle instead of sugar will increase the food value by providing extra minerals and vitamins but porridge with milk is a well-balanced meal in itself.

FOOD CLASSIFICATION CHART

Heat & Energy	Body-building	Protective (Minerals & Vitamins)	Protective (Roughage)
Porridge	Porridge	Porridge	Porridge
Treacle or Sugar	Milk	Milk	Wholemeal Toast
Milk	Eggs	Eggs	Wholemeal Bread
Wholemeal Toast	Fish	Fish	Fruit
Wholemeal Bread	Meat	Meat	
Butter	Wholemeal Toast	Wholemeal Toast	
	Wholemeal Bread	Wholemeal Bread	
		Butter	
		Fruit	

(It will be noted that porridge and wholemeal bread or toast figure in every column. Extras such as toast with butter, marmalade and honey may be added according to appetite.)

Oatmeal Porridge

Ingredients.

2 heaped tablespoonfuls of rolled oats.
1 pint of boiling water.
¼ to ½ teaspoonful salt according to taste.

Method.

1. Put water on to boil and add the salt.
2. Sift the oatmeal carefully into the water stirring all the time until water comes to the boil.
3. Allow the porridge to simmer for half an hour stirring occasionally.

N.B.—Porridge may be cooked in a double saucepan but takes longer. If porridge meal is soaked over night the time of cooking will be shortened.

Wheatmeal Porridge

Ingredients.

2 tablespoonfuls of wheatmeal.
1 pint water (boiling).
¼ to half teaspoonful salt.

Method.

1. Soak meal overnight or mix in a little extra water. Add salt.
2. Stir boiling water into blended meal.
3. Return to saucepan, stir until boiling.
4. Simmer for half an hour, stir occasionally.

BREAKFAST DISHES

Savoury Omelet

The foundation for this will be found under Mushroom Omelet (March-April issue). Any of the following may be used instead of mushrooms.

Finely chopped ham.
Cooked brains—chopped.
Chopped chicken (left-over).
Cooked tomato.

Finely chopped parsley may be added to the omelet itself. No further flavouring is required.

Tomato Cream

Ingredients.

4 tomatoes.
1 tablespoonful butter or margarine.
1 teaspoonful sugar.
2 eggs, ½ teaspoonful salt, pinch cayenne.

Method.

1. Dip tomatoes into boiling water and remove the skins.
2. Melt fat in saucepan, add tomatoes (cut up roughly), sugar, salt, pepper.

3. Cook gently until tomatoes are soft.
4. Allow to cool slightly, then add well beaten eggs, stirring all the time.
5. Stir over a gentle heat until mixture thickens.
6. Serve on hot buttered toast.

N.B.—For a luncheon dish or a sandwich filling, add a few tablespoonfuls of grated cheese to the above mixture.

The offal of sheep is often discarded on a farm. Besides being highly nutritious (rich in protein, iron and "B" vitamins) kidneys, liver, will add variety to the breakfast menu and are to be recommended. Brains also add variety. Here are a few recipes.

Lambs Fry and Bacon

1. Wash the liver in cold salt water. Dry thoroughly.
2. Cut into neat pieces ½in. thick.
3. Season a little flour with salt and pepper.
4. Coat liver well in seasoned flour.
5. Heat some dripping in a frying pan.
6. Cook liver on both sides until brown then more gently until liver is cooked through. This takes 10 to 15 minutes. Test by cutting the largest piece. If there is no sign of red juice, and the liver has lost lost its raw appearance throughout, it is cooked. Serve with fried or grilled bacon and rich brown gravy.

N.B.—Fried onions may be served with liver. Liver should be *very fresh* when used.

Liver in Batter

Ingredients.

½ lb. liver.

2 tablespoonfuls self-raising flour.

Pinch salt.

Cold water.

Method.

1. Wash and dry liver, cut in neat pieces.
2. Make a batter with flour, salt and cold water.
3. Have ready a saucepan of fuming fat.
4. Dip each piece of liver in batter, then fry until a nice golden brown.
5. Serve with bacon.

Grilled Kidneys

1. Wash, skin and dry kidneys.
2. Split in two, rub over with dripping or a butter paper.
3. Heat and grease the grid iron and grill kidneys closely over glowing coals for two minutes on each side. The split side should be grilled first.
4. Grill more slowly until cooked (about eight minutes altogether). Serve with bacon and green butter balls.

Fried Brains

1. Soak brains in salted water half an hour.
2. Remove the skin, dry well.
3. Coat with egg and breadcrumbs.
4. Fry in hot fat until well browned. Serve with fried or grilled bacon. Garnish with lemon and parsley.

OR

1. Soak brains in salt water, skin.
2. Cover with water, bring to boil, strain. (This is called blanching.)
3. Coat with egg and breadcrumbs.
4. Fry in hot fat.
5. Garnish with lemon and parsley.

N.B.—Blanched brains may be used for omelets. If blanched brains are required for sandwiches, simmer for five minutes before pouring off the water.

MERINGUED APPLES

By H. M. GLOSTER

A PLEASING variation of the ever-popular baked apples, is the addition of a meringue covering. Very little extra time is needed to prepare this dish which is a universal favourite with the young folks.

Ingredients.

6 or 7 cooking apples.
Sugar.
Water.
Lemon juice.
Dates, cloves.
1 dessertspoonful butter.
Whites of three eggs.
½ lb. castor sugar.

Method.

1. Choose well-shaped apples of even size.
2. Peel and core the apples, keeping them whole.
3. If liked, stuff with dates and pierce each apple with a clove.
4. Place the apples in a baking-dish or piedish.
5. Sprinkle apples with a little sugar and put a squeeze of lemon juice on each.
6. Just cover the bottom of dish with water.
7. Bake apples *slowly* until soft. Be careful not to overcook or apples will break.
8. Drain off liquid and arrange apples in baking dish with spaces between them.

The Meringue.

1. Whisk whites of eggs until stiff. A pinch of salt will hasten the whisking.
2. Beat in the sugar gradually, a tablespoonful at a time.
3. Pile meringue mixture over the top of each apple, covering fruit entirely.
4. Return to a slow oven and bake very *slowly* until crisp and a pale biscuit colour.
5. Serve with whipped cream or custard made with the egg yolks.

An even more attractive dish may be made by colouring half the meringues with cochineal to a pale pink colour. Sugar or nonpareils (hundreds and thousands) may be sprinkled on top to improve the appearance.

A SOUP-MAKING HINT

WHEN making a puree soup, try this method instead of rubbing ingredients through a sieve or strainer (a tedious process).

1. Pour liquid from soup into a basin.
2. Remove bones, bacon rind, bouquet garni, etc., from saucepan.
3. Mash softened ingredients as you would mash potatoes.
4. Return liquid to saucepan and finish off the soup in the usual way.

PLASTICS IN THE KITCHEN

A LARGE range of plastic sheeting is now available in Perth stores. The material is usually about 24 inches in width and comes in a variety of plain colours and patterns at prices ranging from 11d. to 4s. 11d. a yard according to quality.

One of the most popular lines is a thin transparent cloth at about 11d. a yard and the housewife will find many uses for this material in the kitchen.

It may be made up into bags by either machining, sealing with durex tape or placing the material on an ironing blanket, covering with a thickness of brown paper and running the heel of a warm iron over the edges to be sealed. Care is necessary to see that the iron is not too hot and is only applied to a thin strip where the actual sealing is required.

In addition, the material may be cut into squares and these may be used for wrapping food as required.

Raw vegetables, meat, fish and other foods may be wrapped in these plastic squares before being placed into the refrigerator. This allows more food to be stored without risk of contamination.

Plastic cloth is waterproof and airtight, and vegetables, salad greens, etc. will keep fresh much longer, even without a refrigerator, if they are first wrapped in plastic.

A heavier quality of plastic cloth may be obtained for the wrapping of bread to keep it from drying out in hot weather and these cloths are invaluable for wrapping packed lunches which will be kept fresh and free from contamination.

Smaller pieces of plastic cloth make excellent covers for bottles, jars and jugs. A few of these handy covers with elastic machined round the edge to keep them in position are an asset in any kitchen.

Hygienic.

Plastic materials may be kept quite clean and wholesome by rubbing them over with a clean wet cloth, drying with a clean dry cloth and airing before putting away or using.

The enterprising housewife will doubtless find many other uses for this welcome addition to the modern kitchen—H.M.G.

"STORED SUNLIGHT"

SAVOUR the exquisite fragrance of honey fresh from the comb; note the delightful odours so typical of all that is fresh, pure and healthful; suggesting the haunting perfumes of flowers, new-mown hay, and the rain-washed immaculacy of the countryside with which the spring days are scented . . . Taste its variety of intriguing flavours, and let your palate be delighted by the subtle blends which are never twice the same; flavours which have captured the aroma of the flowers from which the nectar was gathered . . . In its variety of golden hues it is as pleasing to the eye as it is to the palate, a fact which has been realised by many of those allotted the task of preparing show exhibits, for their pyramids of honey-filled jars are attractively illuminated by concealed lighting.

THE SOIL ...OUR BASIC ASSET

WATER EROSION CONTROL—2

By L. C. LIGHTFOOT, B.Sc. Agric., Assistant Commissioner of Soil Conservation

EARTHWORKS are frequently used to help to control or prevent soil erosion where the adjustment of farming methods—as discussed in the March-April issue—is unlikely to be sufficient. Contour earthworks have proved extremely valuable in many cases and incidentally have caused much less inconvenience than most farmers anticipated. Landowners in need of advice on contour earthworks should get in touch with the Soil Conservation Service, Department of Agriculture, Perth, and arrangements will be made for an officer to visit their properties.

CONTOUR PRACTICES

Soil type and slope make some land unsafe for permanent cultivation without more protection than is given by the agronomic measures already suggested.

Unfortunately, farmers are sometimes forced by circumstances, such as lack of labour, machinery, superphosphate, feed, or finance, to do things they know are unsuitable. Consideration must then be given to using contour practices, (banks, furrows, and diversion drains as well as contour working) to give enough support to their agronomic programme to conserve the soil effectively against erosion.

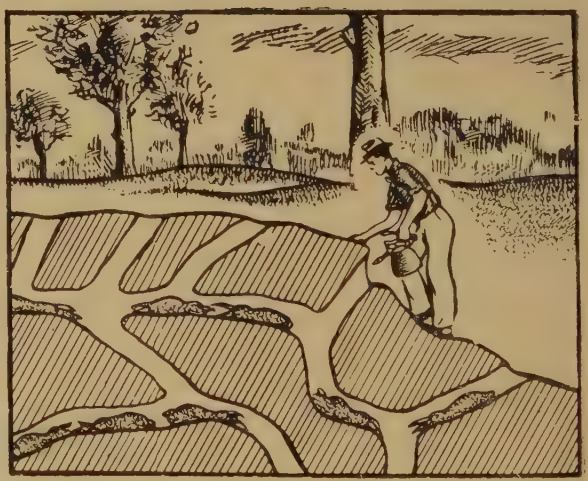
Contour Working.—Contour working means working across the slope on the contour, that is along level lines. Machines of course are tilted by the slope of the ground, but they work along lines joining points of equal level. Contour lines from three to ten chains apart are marked out and the area between

KILL RABBITS

WITH THE TESTED AND PROVEN FUMIGANT

LARVACIDE

LARVACIDE is the most successful post-war rabbit exterminator in use all over Australia. LARVACIDE will not only do **your job** properly, but it will also do it in a fraction of the usual time and at much less than usual cost. Being 5½ times heavier than air, it stays in the burrows and keeps right on killing. For the first time in history you can achieve successful eradication of the greatest curse the man on the land has ever known. Try it yourself —you'll find it does everything claimed.



LARVACIDE is safe to use in accordance with the simple directions on every bottle. Simple and easy to handle, it is absolutely non-inflammable and non-explosive. With LARVACIDE, it is just a "one-second job" to shoot a burrow. Never before has Rabbit Fumigation been so simple or so effective.

Costs Less to Buy too!

2lb. BOTTLES, 25/.
22lb. DRUMS, £13/4/.
LARVALAMPS, 6/9 per doz.
WILMO GUNS, 81/6.

All Prices F.O.R. Perth!

LARVACIDE is available through your usual supplier or direct from the West Australian Distributors— W. G. WALDIE.

SPECIAL NOTICE:

LARVACIDE is also available in convenient Glass Ampoules known as "LARVALAMPS." These are very handy to carry in a tin on horseback for treating odd holes that may have been overlooked. Price 6/9 Carton of 1 dozen. Minimum rail order, case of 1 gross.

W.G.WALDIE

PEST CONTROL SPECIALIST

489 MURRAY ST...B7327, B9421

For those who prefer Calcium Cyanide,

Calcyan

CALCIUM CYANIDE

We recommend CALCYAN

PRICES: 5lb. tin (12 to case) 25/- each, i.e., 5/- per lb. 25lb. tin (4 to case) £5/6/3 each, i.e., 4/3 per lb. PRICES F.O.R. PERTH

Fig. 1.—Soil erosion due to uncontrolled run-off when 90 points of rain fell in 20 minutes on this fallowed hillside. Contour banks across this slope would allow water not absorbed to run downhill for only two or three chains before leading it to a safe discharge point. The land also needs a few years under sub-clover pasture to improve fertility and increase the rate at which it can absorb water. —Photo G. H. Burvil.

each pair of lines is worked round and round as a "land." Sometimes contour working may be enough support to suitable land management to conserve the soil effectively. Where contour working is not enough the other contour practices must be used as needed.

Contour working is likely to be worthwhile on nearly all sloping land on which arable crops are grown or cultivation for pasture renovation purposes is needed. Increased water absorption with better crop and pasture growth is likely to be as important as preventing soil erosion by run-off.

Fig. 2.—Contour working makes every cultivation ridge a miniature dam. This gives the soil a longer time to absorb water during heavy rain. Working along the level uses less power and has proved less inconvenient than expected. —Photo L. C. Lightfoot.

Contour Banks.—Con-banks are ridges or banks of soil built at intervals across the slope. (See Fig. 3.) They may be on the true contour where absorption is the main purpose, or may be given a small grade, usually increasing towards the outlet, to carry run-off slowly across the slope into a safe discharge area. These are the drainage type of bank most commonly used, and they serve to break up a long slope into short sections. Each pair of banks serve as permanent markers for contour working.

Fig. 3.—Contour banks are often needed to control erosion on sloping land. They break up a long slope into a number of short slopes so that when run-off does occur, the water runs downhill a short distance only before being carried slowly across the slope to a safe waterway. Soil fertility and plant cover must be maintained because earthworks alone are not enough to prevent erosion.

—Photo B. a'B. Marsh.

To protect the soil adequately, many areas will require contour banks as further support for all appropriate good land management practices and contour working. Areas needing contour banks may be listed:—

(1) Sloping lands already moderately damaged by erosion.

(2) Most steeper land on which arable cropping will be continued, say slopes between 5% and 10% (a slope is 10% if there is a fall of 10 feet in 100 feet along the ground straight downhill).

(3) Lands of more than 2% or 3% slope used for orchards, vineyards, intertilled row crops, or for any arable crops on soils which erode easily.

It would probably be better not to use land steeper than 8% slope for arable crops, but certainly 10% with odd patches steeper, should be the steepest land regularly cultivated for crops in Western Australia except in special cases and using special precautions.

Pasture furrows on true contour but sometimes on a slight grade, are ploughed in steep country to help the soil absorb rainwater near where it falls instead of running off. Big absorption banks are used for the same purpose where needed, and big diversion drains, which have a fall to carry water from high land to a safe discharge so that it will not erode lower slopes, are sometimes used.

CONTOUR PRACTICES CAN'T DO THE JOB ALONE

Obviously soil erosion due to water, is caused mostly by the uncontrolled run-off of rainwater not absorbed by the soil. Improved pastures give plant cover and fertility. More careful grazing, less frequent cropping and cultivation, and less fallow where feasible.

all promote water absorption and lessen run-off, and resist the soil scouring effect of run-off when it does occur.

When all these things are considered inadequate, officers of the Soil Conservation Service advise the use of contour practices deemed appropriate to each area of land big enough to be treated separately. But it must be remembered that more than 150 years' experience in United States of America of using contour practices without appropriate adjustment of cultivation and crop rotation have shown that contouring and earthworks alone, cannot conserve the soil and its fertility.

PRACTICES SHOULD SUPPORT EACH OTHER

It will be seen that no one practice alone, is likely to achieve effective soil conservation. The successful establishment of a complete tree cover, or a complete grass cover, are probable exceptions.

Even then all the methods needed to maintain a healthy forest or healthy pastures would need to be used. Tree planting may be of limited use but does not seem likely to be of general value for big areas.

Pasture improvement has very great possibilities and is indeed the most important single soil conserving practice for much of our agricultural land. But mostly it is desirable to use an arable crop, usually one of the cereals, to give a rotation, to renovate the pasture, and to give flexibility to the farm programme. If wheat, or any other crop the farmer can handle with his equipment becomes particularly attractive financially, it is obviously desirable to increase the cropped area for a few years if this can be done without exhausting soil fertility unduly or increasing the erosion hazard too much.

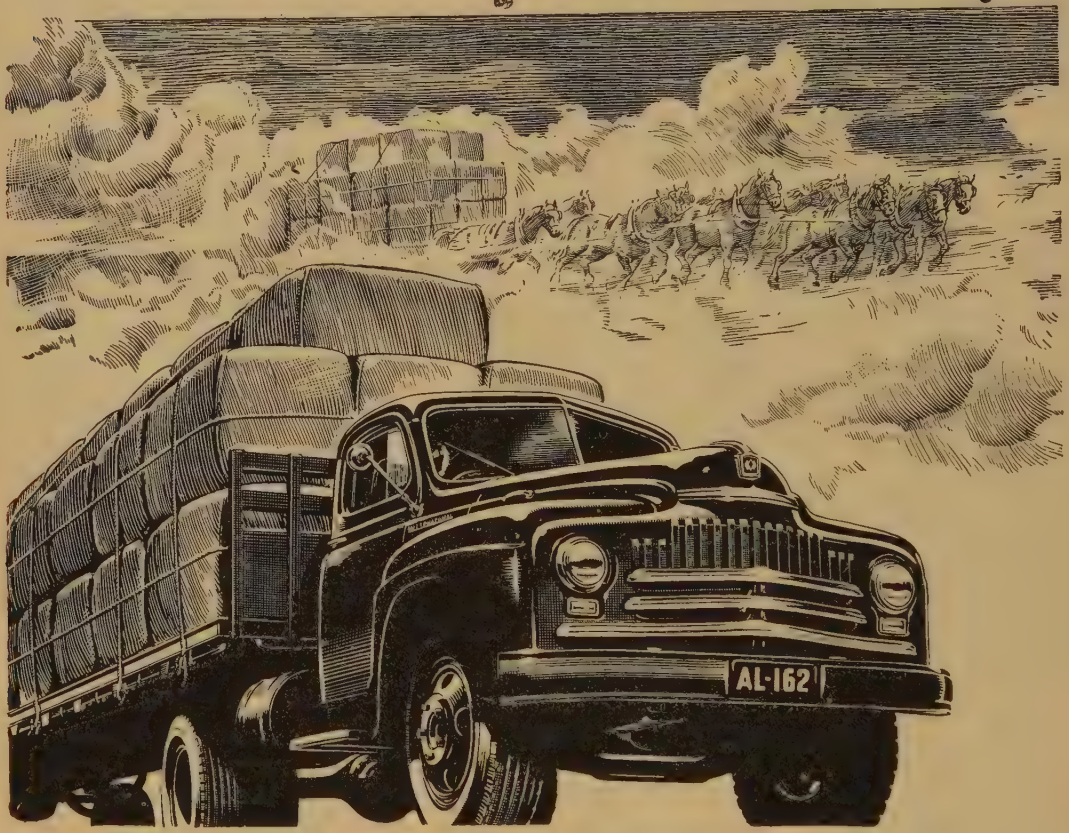
The farmer who normally uses fertility-building legumes for pasture and fodder crops with arable crops on a wide rotation, and also uses whatever contour practices are desirable on his land to give a complete soil conserving plan using every measure appropriate to his land and climate, will be able to do this safely. When the incentive for more cropping passes the conservation farmer will revert to more pasture and stock as they become relatively more profitable. In this way soil fertility will be rapidly restored and heavier cropping again safely practised when the incentive comes once more.

MAINTENANCE

Land management or agronomic soil conserving measures must always be considered and practised; every day, every week, and every season.

Fig. 4.—Pasture furrows on contour are used on sloping land too steep or too stony for arable crops. The extra water absorbed usually improves pasture growth and this helps to protect lower land. Many of our mallet hills need pasture furrows.
—Photo B. a'B. Marsh.

INTERNATIONAL HARVESTER—BUILDER OF ESSENTIAL EQUIPMENT FOR ESSENTIAL WORK



Carriers of the Nation's Cargoes

THE rapid growth of population and continued expansion of industry has brought increased dependence on road transport for reliable and efficient handling of goods on Australia's half-million miles of roads.

The flexibility of the motor truck has made it one of the most important tools of modern transportation. Whether for the haulage of primary products for transhipment by rail, sea or air, or for the delivery of manufactured goods from producer to consumer, the motor truck is the vital link between all the transport services. Today, even wider application of motor transport with Australian agriculture, commerce and industry, is essential to our national development and security.

From the first International Auto Wagon of 1909 to the handsome heavy-duty engineered models of today, International trucks have served the Australian transport industry faithfully and economically. Increased local manufacture brings the assurance that International trucks will make an even greater contribution to the Commonwealth's future transport needs.

International Harvester Company of Australia Pty. Ltd.
(INCORPORATED IN VICTORIA)

District Sales Offices in all Capital Cities.
Works: Geelong and Dandenong, Victoria.

INTERNATIONAL HARVESTER

332-24
McCormick International
Tractors and Farm Equipment
International Trucks
Defender Refrigerators
International Industrial Power

Please mention the "Journal of Agriculture, W.A.," when writing to advertisers

Contour earthworks must be watched and maintained. **Fire hazard** is increased by a programme using more cover and fire precautions become more important.

EFFICIENCY OF SOIL CONSERVING METHODS

This varies with conditions and management. Where all appropriate measures and maintenance are used, efficiency is practically 100%.

But contour earthworks are expensive and it is usual to build earthworks which are likely to need repairing every few years. This keeps both first cost and working costs down. If earthworks big enough to stand up to all rains are desired, they must be very big and close together and this makes paddock work unduly awkward. Considerable risks of earthworks being inadequate, are normally taken during the early years of soil conservation work on any area while increasing cover and soil fertility and absorptive rate gradually give more support to the earthworks.

Fig. 5.—Improved pastures give fertility, enable soils to absorb water more quickly, and provide plant cover. These combine to make soil resist the scouring effect of run-off when it does occur. When 337 points of rain fell on this sub-clover paddock in two hours there was practically no evidence of soil loss. The darker patches are heaps of pasture.

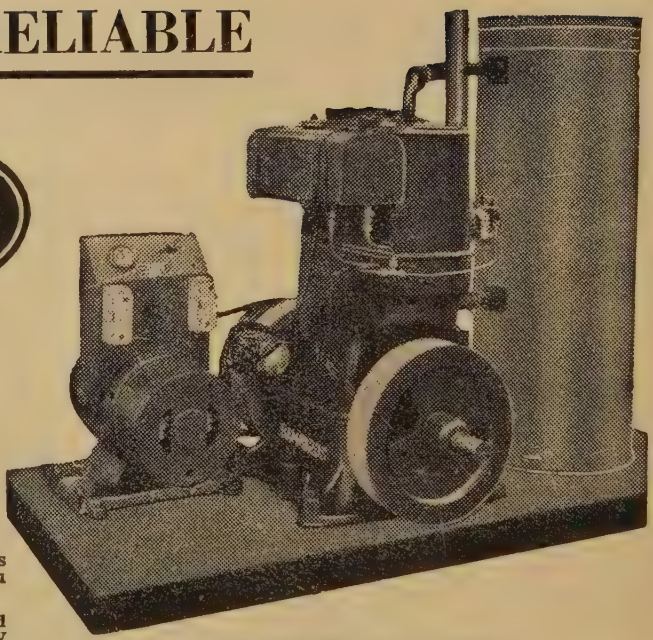
—Photo G. H. Burvill.

RESULTS OF FIELD WORK OF THE CONTROL AND PREVENTION OF SOIL EROSION BY WATER IN W.A. FROM EARLY 1947 TO EARLY 1952.

During this period, and considering only those cases where contour practices have been recommended to support suitable land management adjustments, farmers and Soil Conservation Officers have co-operated in treating about 100 areas of eroded soil from Northampton to Gnowangerup. Although these have not been fully tested, they have given goods results generally and have mostly started to pay their way in the first season. Farmers therefore have the opportunity to control water erosion of the soil where it exists and prevent further erosion by working in co-operation with the Soil Conservation Service using methods which will soon pay for themselves and show a profit. Exhausted and moderately eroded soils can usually be economically restored and protected, but if water erosion is allowed to go too far, reclamation and control may become too costly. Prevention of soil erosion is better and cheaper than control and reclamation of eroded land.

RUGGED and RELIABLE

Bamford



4 h.p. slow speed KERO

LIGHTING PLANT

WITH 1,500 WATT BAMFORD BRITON GENERATOR

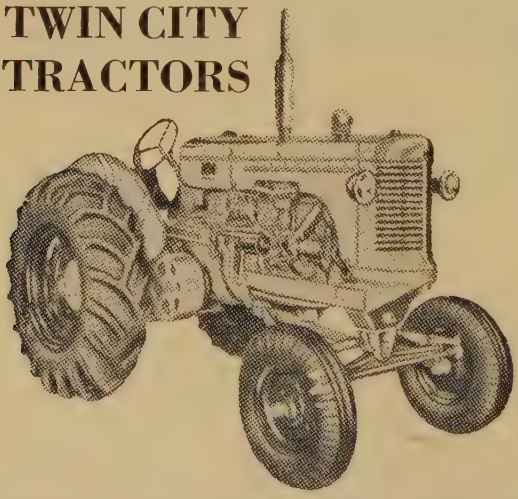
Massive, powerful and reliable is Bamford's newest achievement. Here are the facts you want to know:—

4 h.p. British Bamford Kero. Engine fitted with Twin Balanced Flywheels. Drive: Twin V Pulleys (Cast Iron) and B section belts. 1,500 Watt Bamford Briton Generator complete with Switchboard consisting of Field Regulator, Amp. Meter, Line and Battery Fuses, Battery Cut-out, Press Button Starter

ECONOMY FEATURES

The economy of this type of Lighting Plant is widely known. Both initial cost and running costs are suprisingly low. And remember, the Plant may be purchased on Convenient Deposit and Easy Terms

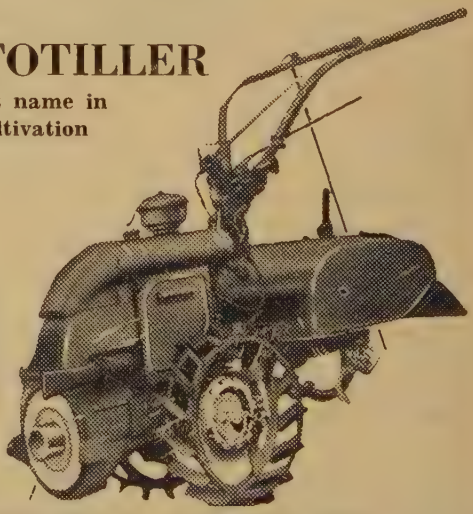
TWIN CITY TRACTORS



Farmers all over Australia have been waiting for these famous American tractors. The outstanding features for dependable performance and assured economy built into these tractors by Minneapolis-Moline engineers make them the GREATEST TRACTOR BUY in the farm field demanding an abundance of power. Twin City Tractors are built to give outstanding fuel and maintenance economy

ROTOTILLER

Greatest name in light cultivation



Throughout the world—more people in more countries use the ROTOTILLER than any other agricultural implement of comparable size and application. The Simar Rototiller organisation won world renown for the introduction of the ROTOTILLER "35" and "56." They are built to last and do many jobs. No matter the size of your property you'll find a use for ROTOTILLER

RAY J. SHARPE PTY. LTD.

860 HAY STREET, PERTH——————B 8312, B 6512

Planning Boosts Poultry Profits

By K. D. GILES, B.Sc. Agric., Poultry Adviser

AMAZING as it may seem, the time and labour expended in the ordinary every-day chores on a poultry farm carrying 1,000 birds can be reduced five times by adopting modern efficiency methods. This will appeal to poultry farmers in this State who know that low labour costs are closely linked to high profits.

That such a saving of time and labour is possible was conclusively proved in a series of practical tests conducted by L. M. Hurd of the New York Agricultural College, Cornell, U.S.A. He found that it could be achieved with little additional expense simply by planning the farm successfully and following a few simple rules.

The recommendations made by Mr. Hurd in his Extension Poultry Farm Service Letter are substantially the same as those which are advocated by the Poultry Branch of our own Department of Agriculture. The Department's recommendations are as follows:—

Have large laying sheds to reduce the opening and closing of many doors; to reduce the number of waterers and the number of places to gather eggs and to make for easier clearing. One house can accommodate as many as 800 birds providing three square feet per bird (semi-intensive) or four square feet per bird (intensive) is allowed.

Have an automatic water supply and an efficient method of draining containers.

Have community type nests near the door, to save travel in gathering eggs. The habits of hens are largely what you make them. They will come to you or you can go to them. The nest should be kept reasonably dark but must have adequate ventilation on hot days. White sawdust will be found excellent nesting material.

Have egg room nearby, to reduce travel and encourage more frequent gathering of eggs without too much extra work. To ensure good quality eggs they should be collected three times daily and be stored in a cool, non-draughty place.

Provide handy disposal methods, to make the job of removing droppings and litter easier and less time-consuming. Use the deep litter system to reduce the number of cleanings.

Combine as many operations as possible. There is a wide variation in the number of things that are done by different poultrymen on each trip through the laying shed, and in the number of trips that are made to do the jobs.

Have buildings and work areas close together to reduce travel.

Provide for circular travels to eliminate backtracking.

Use gravity to move feed and supplies, e.g., have feed shed at a higher level than the sheds and use feed bins and self-feeders.

Provide suitable paths, alleys and doorways that are sufficiently wide, level and smooth for carts.

Locate tools and supplies at the place where the work is done.

Combine jobs and carry them out to a system.

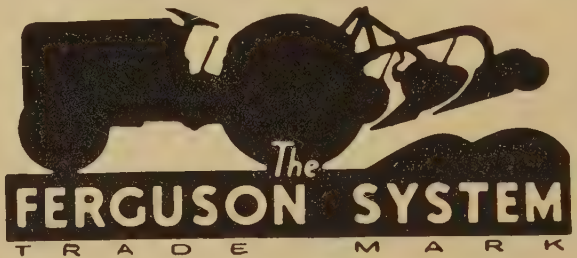
Plan to complete one operation where another begins.

Reduce trips by handling maximum practical loads.

Work at reasonable speed—avoid wasting energy.

All dry mash feeding in self-feeders or open troughs reduces the number of feedings and ensures that birds have food available at all times.

Try these time and labour-saving ideas on YOUR property. You will find them well worth any small initial cost incurred in changing over from the old methods. The "proof of the pudding" will soon be evident in more leisure hours and/or a greater output per man.



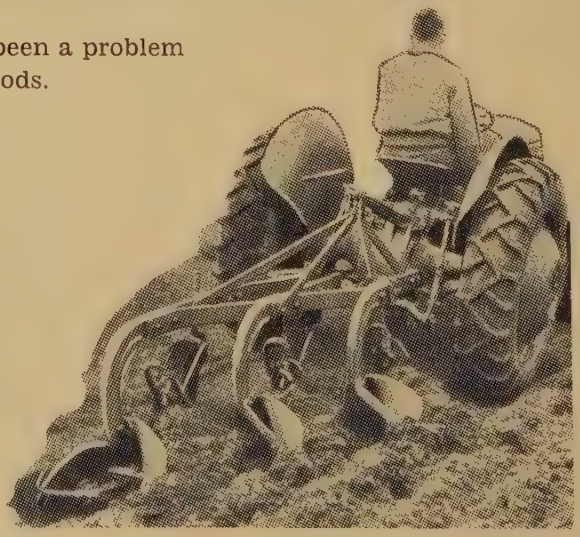
Provides a Plough for Every Purpose

Only buyers of a **NEW FERGUSON SYSTEM** have the convenience of purchasing their choice of these Seven types of Ploughs

3-FURROW 10-INCH MOULDBOARD
2-FURROW 10-INCH MOULDBOARD
2-FURROW 12-INCH MOULDBOARD
SINGLE FURROW 16-INCH MOULDBOARD
2-FURROW 12-in. OFFSET MOULDBOARD
2-FURROW 10-INCH HEAVY DUTY DISC
3-FURROW 10-INCH HEAVY DUTY DISC

Ploughing on the contour has been a problem with ordinary ploughing methods.

Ferguson has altered this.



Whether you wish to plough a shallow sod or deep, in trashy conditions or clean, virgin ground or old grass land, there is a Ferguson Plough for your job. Inquire from your Local Agent or . . . .

British Tractor and Machinery Co.

121 HAY STREET, SUBIACO. W 2626

HYDROCYANIC ACID (HCN) POISONING

Poison Rush Causes Heavy Sheep Mortality

WHEN newly developed country is to be stocked with sheep or cattle it is important to make sure that it is free of poison plants. A large proportion of the native poison plants belong to the genera Oxylobium and Gastrolobium, typical examples being Box and York Road poisons, but the cyanogenetic plants form an important group.

Cyanogenetic plants contain a chemical substance which is broken down in the rumen or paunch by enzymes either contained in the plant itself or in other plants eaten at the same time, resulting in the liberation of hydrocyanic or prussic acid, which is highly poisonous.

The HCN content of these plants varies according to climate and weather conditions, but is usually much greater in young shoots than in mature leaves which may be harmless. Consequently, there is a greater risk of poisoning when plants are making active growth after rain which has been preceded by a dry spell.

Hungry stock are most frequently affected, and symptoms usually occur within an hour or two of eating the plant, but this may sometimes be delayed until after watering. They consist of trembling, a slightly staggering gait, and laboured respiration, followed by collapse, frothing at the mouth, and death, sometimes within the space of a few minutes.

ANTIDOTE

As an antidote for HCN poisoning, drenching with a solution prepared by dissolving 2 oz. of sodium hyposulphide (the "hypo" used by photographers) in a pint of water is recommended. In the case of cattle, the whole of this solution is administered, and the treatment is repeated at half-hourly intervals. For sheep, the dosage is four fluid ounces (a fifth of a pint) repeated at similar intervals.

The risks associated with the grazing of sorghum, sudan grass, and allied species is well known, but there are several native plants which may be equally dangerous.

These include mat balsam (Euphorbia Drummondi), goosefoot (Chenopodium spp.), clover-leaved poison (Goodia latifolia), native trefoil (Lotus Australis), native fuschia (Eremophila maculata), and poison rush (Schoenus spp.).

A mortality involving the loss of more than 200 sheep in a flock of 800 within 24 hours of their transfer to a newly developed area was recently reported from Carnamah. The paddock consisted of undulating sand plain country with moist depressions, one of which contained a dense stand of poison rush which had been heavily grazed. Sheep had been running in this paddock three to four months previously without suffering ill effects.

Poison rush occurs in the Northern Agricultural areas between Dangarragan and Mullewa, and it is important that it should be recognised by stock owners.

A description of the plant will be given in the next issue of this Journal.

JOURNAL OF AGRICULTURE OF W.A.

RATES FOR ADVERTISING SPACE

Commencing with First Issue of New Series—Jan.-Feb., 1952

Inside pages (per insertion):

	7 to 12 Months	2 to 6 Months	Single Insertion
	£ s. d.	£ s. d.	£ s. d.
Full page	8 10 0	9 15 0	10 10 0
Half page	5 10 0	6 0 0	6 10 0
Quarter page	3 10 0	4 0 0	4 10 0
Cover Positions (full page only —all two colour):			
Outside back	14 10 0	15 0 0	15 10 0
Inside front	12 10 0	13 0 0	13 10 0
Inside back	11 10 0	12 0 0	12 10 0

- COOPER'S POWDER DIP
- COOPER'S QUICK-ACTING POWDER DIP
- COOPER'S GAMATOX SHEEP DIP

● *Use a Cooper Dip and dip all sheep thoroughly*

YOU CAN LEAVE THE REST TO COOPERS

Manufactured by

WILLIAM COOPER & NEPHEWS (AUSTRALIA) PTY. LTD., 9-11 O'CONNELL ST., SYDNEY

Western Australian Distributors:

C32A. WA. ELDER SMITH & CO. LIMITED, PERTH and BRANCHES

WHEAT CROP COMPETITIONS

Details of W.A. Flour Millowners' Assn. Series

By I. THOMAS, Superintendent of Wheat Farming
and
H. G. CARISS, B.Sc. Agric., Agricultural Adviser

FOR many years prior to the last war, 50-acre crop competitions were sponsored and conducted by the Royal Agricultural Society and judged by officers of the Department of Agriculture. These competitions always proved successful and without doubt contributed in no small way to the development of the cereal-growing areas, particularly as far as wheat farming is concerned.

The conducting of these crop competitions lapsed during the war but, in 1946 a new series, sponsored by the W.A. Flour Millowners' Association, was inaugurated and conducted under the auspices of the Royal Agricultural Society with the field judging again being carried out by departmental officers. The whole of the prize money amounting to £495 annually is being donated by the W.A. Millowners' Association.

In the new series of competitions, points are allotted for the flour strength (baking quality) of the flour produced from the wheat obtained from the competing crop. The strength figure is determined on the farinograph and in this feature, this crop competition is unique in Australia and possibly elsewhere. The object of the Association, in sponsoring the competition, was to encourage the production of wheats which were not only high-yielding but were also capable of producing good quality flour.

The conditions regarding the awarding of points for baking quality included the provision that no prize was to be awarded to any crop which returned a strength figure of less than five minutes as measured on the farinograph, an instrument used in the laboratory for the determination of the baking quality of flour. It was further decided that maximum points for strength would be awarded to all crops which returned a strength figure of ten or more minutes. This condition was made so that the points awarded for baking quality would not outweigh those for yields. Because of this, no advantage could be gained by a competitor entering a crop of a variety having a specially high baking quality.

As stated above, crop competitions have been conducted under the auspices of the Royal Agricultural Society for many years and were a feature of pre-war wheatbelt farming. For the purpose of judging, the wheatbelt has since 1940, been divided into seven zones having regard to climatic and other seasonal conditions. These zones are as set out in the accompanying map.

The conditions and details of the competition, as they existed for the 1951/52 season, are as follows:—

CONDITIONS

1. The area of each competing crop must be not less than 50 acres of any one of the following registered varieties:—Bencubbin, Bungulla, Charter, Eureka, Koorda, Kondut, Merredin, Gabo, Kendee, Wongoondy, Yalta.

2. Each competitor will be limited to one entry in each zone.

3. The competition will be judged on the following scale of points:—

(a)	Yield per acre	50 points
(b)	Freedom from admixture	10 points
(c)	Freedom from disease	10 points
(d)	Baking quality of flour	30 points
	Total	100 points

4. The competition crop must be a compact and unbroken block of not less than 50 acres with straight sides, except on natural boundaries and must be clearly defined before the arrival of the judge and easily discernible to him by either binder tracks cut or corner pegs showing prominently above the crop. Only the standing crop, the grain of which is recoverable by recognised harvesting practice is to be taken into consideration.

5. The competitor must arrange for the judge to be met on arrival, conveyed to the plot of wheat, and following inspection, the competitor must convey the judge to the next nearest competitor in his district if required.

6. The judge's report will be available for publication.

7. One bag of wheat from each prize winning crop must be exhibited at the succeeding Royal Show with a card attached showing the points allotted to it.

8. The entry for each crop shall be 5s. Where district competitions are held under similar conditions to this competition, only the first and second prize winners in such competitions will be eligible to compete. Secretaries of Agricultural Societies conducting such District Competitions must, on or before the 14th September, 1951, forward to the secretary of the Royal Agricultural Society, the entry fee of 10s. to cover the entries in their district competition and later, when the names of the place getters are known, forward the names and addresses of these competitors to the Royal Agricultural Society.

9. All entries must be lodged with the Royal Agricultural Society not later than 14th September, 1951.

10. Prizes are offered as under:—

In each zone—First, £40; Second, £15. Zone winners will be eligible for State Championship prizes of—First, £60 (including trophy to be selected by winner); Second, £30; Third, £20.

11. No prize will be awarded to any variety should the strength figure of its flour be below five minutes as determined on the farinograph, or to any crop awarded less than a total of 60 points.

It will be noted that as with similar previous competitions, provision is made for State Championship awards as well as for Zone Championships.

As stated earlier, the first competition in this series was conducted during 1946 and the results for that season and 1947/48 were published in the Departmental Journal, Volume 25, March, 1948.

It is proposed, therefore, in this present report on the competition, to include the details of the Championship awards for 1948/49, 1949/50, 1950/51, the complete details for the 1951/52 seasons competition just concluded and brief comments on the general results obtained over the six years the competition has now been operating.

The winners of the State Championship award for each year since the inception of this competition in 1946, are as follows:—

Year.	Competitor.	Address.	Zone.	Variety.	Points.
1946	J. L. Hughes	Wongoondy	2	Bungulla	87
1947	G. R. Moir	Borden	6	Kondut	88
1948	H. L. Kelsall	Moora	1	do.	93
1949	G. R. Moir	Borden	6	do.	88
1950	H. L. Kelsall	Moora	1	do.	94
1951	C. J. Halligan	Waddington	3	do.	90

It will be noted from the above table that the late midseason variety Kondut has won the Championship five times in succession and also that Messrs. G. R. Moir, of Borden (Zone 6), and H. L. Kelsall, of Moora (Zone 1), have both been awarded the Championship on two occasions.

In connection with the Championship awards, Mr. E. F. Smart, of Mingenew, in 1950 donated a shield to be awarded to the winner of the competition in the 1950 and succeeding years. The shield must be won three times in all before becoming the property of any competitor. Each year a replica is presented to the winner. The shield has now been won once each by Messrs. H. L. Kelsall and C. J. Halligan.

1948-49 SEASON

During this season a total of 91 entries were received and of these 70 were actually submitted to the judges and were inclusive of local competitions, the prize winners of whom were eligible to participate in the main competition. The average yield per acre for the entries judged covered a rather wide range of from 11-45 bushels per acre. However, 23 of the crops recorded 30 bushels or more per acre and of these, two recorded 40 bushels or more, the average yield for all crops being 27 bushels per acre.

The season generally over the cereal growing areas was rather a difficult one and the yields obtained must be considered good having due regard to the rainfall and other climatic conditions.

The winner of the Championship was Mr. H. L. Kelsall, of Moora (Zone 1), with a crop of Kondut which was calculated to yield 45 bushels per acre and obtained the maximum (30 points) for baking strength, and a grand total of 93 points.

Second place was awarded to S. B. Doust, also of Moora, whose crop of Bencubbin was calculated to yield 40 bushels per acre and gained a total of

85 points. In third place was Mr. E. F. Smart, of Wongan Hills (Zone 3), with a crop of Kondut calculated to yield 36 bushels per acre with a grand total of 84 points.

1949-50 SEASON

For this season a total of 93 entries was received but only 64 were actually judged. In spite of the fact that seasonal conditions, like those for the previous season, were somewhat against high yields being obtained, many excellent crops were judged and the results from this season must be considered satisfactory. The range of yield per acre for all crops was 14-45 bushels per acre, for an average of 27.3 bushels per acre. Of the crops judged, 20 recorded yields of 30 or more bushels per acre and of these, two yielded 40 bushels or more and seven yielded 35 bushels or more per acre.

The Championship was won for the second time by Mr. G. R. Moir, of Borden (Zone 6), with a crop of Kondut which was calculated to yield 45 bushels per acre and gained a total of 88 points.

Mr. W. B. Stewart, of Borden, gained second place with another crop of Kondut estimated to yield 42 bushels. His total of points was 86, just three points ahead of the third place-getter, Mr. G. B. Hebiton, of Mendel, whose 36-bushel crop of Gabo gained full marks (30 points) for baking strength.

1950-51 SEASON

Inclusive of those entries made with local agricultural societies a total of 114 entries were received and of these 87 were judged.

Though the actual rainfall recorded during the season approached a record low, the incidence was excellent enabling the crops to produce high yields and resulting in the average yield per acre for the State as a whole, at 15.9 bushels per acre, being a record. The high yields were reflected in this competition where the average yield was 30.3 bushels per acre and the range 17-45 bushels per acre.

Of the crops judged, over half, viz., 47, recorded yields of 30 bushels or more per acre and of these 10 yielded 40 bushels or more; and 25, 35 bushels or more per acre.

The Championship was won, for the second occasion by Mr. H. L. Kelsall, of Moora (Zone 1), whose crop of Kondut was calculated to yield 46 bushels per acre and obtained the highest number of aggregate points (94) since the inauguration of the present competition. Mr. Kelsall also won the right to hold (for the first time) the E. F. Smart Shield for one year and receive a replica.

Mr. E. F. Smart, of Mingenew, had a 47-bushel crop of Bungulla which gained second place with a total of 89 points, and he was closely followed by Mr. W. B. Stewart, of Borden, who scored 88 points with a crop of Kendee estimated to yield 44 bushels to the acre.

1951-52 SEASON

The current season was rather difficult with extended dry periods in many districts coupled with unsatisfactory finishing conditions followed by damaging storms in some districts. Possibly through the result of the seasonal conditions, the total number of entries received (89) was somewhat less than for the previous three seasons; as with the other years, entries included those in local district agricultural societies' competitions. To determine those eligible for inclusion in the final judging, 67 crops were inspected of which only 51 were actually eligible. This season the baking strength of the wheat from the crops judged was of major importance in determining those eligible for consideration in the final judging as 21 of all the crops judged (including 13 in the main competition) failed to obtain the minimum strength of five minutes. A contributing factor to the low strength figures was, in all probability, the excessively wet conditions experienced during the early part of the winter.

This year the State Championship was awarded to the crop of Kondut entered by Mr. C. J. Halligan of Waddington for the calculated yield of 43 bushels per acre and total points of 90, Mr. Halligan now holds the shield for one year and receives a replica. As will be noticed from the discussion later on the individual zone results, this crop had been planted on clover ley land.

Details of the complete Championship awards are as follows:—

Name.	Address.	Variety.	Yield.	Freedom from Admixture.	Freedom from Disease.	Baking Strength.	Total.
Halligan, C. J. .... Zone 3	Waddington	Kondut	43	9	9	29	90
Carter, L. .... Zone 2	Morowa	Bungulla	45	9	8	25	87
Hyde, N. F. & Sons Zone 1	Waddi Forest	Wongoondy	39	9	9	29	86
Kelsall, H. L. .... Zone 1	Moora	Kondut	40	8	7	29	84
Dunwell, F. .... Zone 5	Narembeen	do.	40	9	8	26	83
Wright, E. H. .... Zone 6	Gnowangerup	Kendee	39	9	9	26	83
Davies Bros. .... Zone 3	Benjaberring	Bencubbin	39	9	9	25	82
Stewart, W. B. .... Zone 6	Borden	Wongoondy	38	9	9	26	82
Hyde, N. F. & Sons Zone 2	Latham	do.	36	9	9	26	80
Dunwell, D. .... Zone 5	Narembeen	Bencubbin	36	9	8	25	78
Bahr, E. O. & Son .... Zone 7	Kukerin	Gabo	29	9	8	30	76
Creagh, H. & Sons .... Zone 4	Nungarin	Wongoondy	29	9	9	27	74
Hull, W. .... Zone 4	Yelbeni	Bencubbin	31	8	8	26	73
Kent, R. S. .... Zone 7	Kukerin	do.	27	7	9	26	69

Though the early opening seasonal conditions were quite satisfactory, the comparatively dry conditions experienced during July and August and the lack of reasonable finishing conditions affected crop yields over the State as a whole. The calculated yields for this competition ranging as they did from 17-45 bushels per acre for an average of 31.1 bushels per acre, must be considered very good. Thirty-seven or over half of the crops judged, recorded yields of 30 bushels or more per acre and of these, six yielded 40 bushels or more.

Full details of the awards from the different zones and the judge's reports covering the 1951-52 season's competition will be published in the next issue of this journal.

SHELL

HORTICULTURAL PRODUCTS

Many years of highly scientific study and research both in the laboratory and in the field, have gone into the perfecting of Shell Spraying Oils and Grafting Mastics which to-day are recognised all over Australia as the standard of quality, each for its particular job

SPRAYING OILS

★ SHELL WHITESPRAY
★ SHELL PALESPRAY
★ SHELL RED SPRAY
★ SHELLICIDE "D"
★ SHELL APHIS SPRAY
★ SHELL UNIVERSAL D.N.C. WINTERSPRAY
★ SHELLESTONE

GRAFTING MASTICS

★ GRAFTING MASTIC "H"
★ GRAFTING MASTIC "L"
★ COLGRAFT

SHELL SPRAYING OILS AVAILABLE IN 1-GALLON TINS, 4-GALLON TINS OR DRUMS (according to availability of packages) AND 44-GALLON DRUMS

GRAFTING MASTICS ALL AVAILABLE IN 1, 5 AND 36lb. TINS

The Shell Company of Australia Limited
(Incorporated in Great Britain)

NEW CEREAL VARIETIES IN AUSTRALIA

By I. THOMAS, Registrar of Cereal Varieties in Australia
and J. REEVES, Agricultural Adviser

IN 1927 a conference of the State Ministers of Agriculture resolved that to avoid duplication, the names of new cereal varieties be circulated among the States and subsequently confirmed at a meeting of Ministers. Particulars of new varieties as submitted to the Registrar are as follows:—

Festival.—The cross Pusa 111 X (Kenya C.6041 x Baringa) was made at Glen Innes in 1936 by Mr. (now Dr.) S. L. Macindoe, of the N.S.W. Department of Agriculture.

The maturity is early. It is resistant to all forms of stem rust. Although also resistant to flag smut, it is susceptible to leaf rust and bunt. The straw, of medium height, is fine and yellow; the early growth is strong and erect and the amount of tillering is good.

The head is white, tapering, downy and is partly bearded. The grain is white, angular, translucent and is regarded as being of good milling quality, with an inherently high bushel weight. The gluten is very strong, probably comparable with Pusa 111.

Panther.—The cross Nabawa x (Riverina x Hope) was made by Messrs. I. F. Phipps and S. R. Hockley at Adelaide in 1932 and was selected at the Waite Agricultural Research Institute, Adelaide, South Australia.

The maturity is late, the straw is tall and fine. The young growth is spreading and the amount of tillering is medium. The head is white, smooth and partly bearded. The grain is white, round and semi-translucent. It is described as being of superior baking quality. It is resistant to stem rust races 126 and 126B and is expected to be resistant to the new complex of races originating in N.S.W. in 1948. It also possesses a moderate resistance to leaf rust.

Dirk.—The cross Ford x Dundee was made by Mr. E. J. Breakwell at Roseworthy College, S.A., in 1933.

The maturity is early, the medium height straw is fine and white. The early growth is erect and the amount of tillering is good. The head is white, smooth and partly bearded. The grain is white, angular and translucent.

A general outline of this wheat is given in the following extract from the form of registration submitted by Roseworthy College:—

"The variety Dirk is submitted for registration primarily to enable the registration of Dirk 48. Dirk was unofficially released to S.A. farmers in 1946 as an early maturing variety of high yield, particularly under good rainfall conditions, producing a medium strong flour, but without any inherent resistance to disease."

Dirk 48.—This back-cross derivative was crossed by Messrs. A. T. Pugsley and S. R. Hockley at Adelaide in the years 1942-44, by crossing Gabo four times with Dirk (1). It was released by the Waite Agricultural Research Institute. S.A. The variety is identical in char-

(1) The back-cross technique was described by Thomas and Watson in the September 1950 issue of this Journal.

acteristics to Dirk, except that it is resistant to stem rust races 126 and 126B. Like Dirk it is susceptible to flag smut and to the stem rust complex originating in N.S.W. in 1948.

Insignia 49.—The variety Gabo was back crossed five times with Insignia by Mr. A. T. Pugsley, at Adelaide in 1945-46, and the selection carried out at Waite Agricultural Research Institute. It is resistant to the stem rust races 126 and 126B, but is susceptible to the new complex of stem rust races isolated in N.S.W. in 1948.

The maturity is early, the straw stout and short. The young growth is erect, strong and the amount of tillering is good.

The head is brown, smooth, square and partly bearded. The grain is white, round and starchy.

THE AGE OF A HORSE

THIS ancient rhyme, if memorised, will prove a useful method of calculating a horse's age by inspection of the teeth.

To tell the age of any horse,
Inspect the lower jaw of course,
The six front teeth the tale will tell,
And every doubt and fear dispel.
Two middle "nippers" you behold
Before the colt is two weeks old.
Before eight weeks two more will come;
Eight months, the "corners" cut the gum.
Two outside grooves will disappear
From middle two in just one year.
In two years from the second pair;
In three, the corners, too, are bare.
At two the middle "nippers" drop:
At three the second pair can't stop.
When four years old the third pair goes;
At five, a full new set he shows,
The deep black spots will pass from view,
At six years from the middle two.
The second pair, at seven years;
At eight, the spot each "corner" clears.
From middle "nippers" upper jaw,
At nine, the black spots will withdraw.
The second pair at ten are white,
Eleven finds the "corners" light.
As time goes on, the horsemen know,
The oval teeth three-sided grow;
They longer get, project before,
Till twenty, when we know no more.

BLACKLEG

DEATHS of calves from Blackleg have been reported on several properties in the Bunbury district despite the fact that the calves had been immunised with a vaccine prepared by the Commonwealth Serum Laboratories and successfully used in this State and elsewhere for a number of years. Similar reports of failure of the vaccine in conferring immunity have also been received from the Eastern States.

Although the mortality rates have not been serious, the breakdown of this long-established vaccine is causing serious concern and in an endeavour to prevent further losses animals in affected herds have been re-inoculated with a special experimental vaccine supplied free of cost by the Commonwealth Serum Laboratories.

This special vaccine has been prepared from new strains of the Blackleg micro-organisms and it is hoped that it will prove more effective as an immunising agent.

A bulk supply of the vaccine is being held by the Government Veterinary Surgeon at Bunbury and will be made available to stock owners immediately mortalities are reported.

Experimental work now inaugurated is designed to discover the cause of the breakdown and to provide more effective vaccines.

POTATO-HARVESTING MACHINES

LESS than 15% of Australian potato-growers own mechanical diggers stated the Director General of Agriculture (Mr. Frank W. Bulcock) in replying to inquiries addressed to him by the West Australian Minister for Agriculture (Sir Charles Latham).

At present, said the Director-General, there are several types of Australian-made mechanical potato-diggers on the market, mainly tractor-drawn outfits driven by the power take-off. A few imported models of similar type are available.

Price ranges for these tractor-drawn machines run from about £120 to £380, and horse-drawn ground-wheel drive machines range from about £95 to £127 in price.

Two imported potato harvesters, one at £900 and one at £1,035 are now under test and will be tried out this year under varying conditions and in different types of soils.

Mr. Bulcock does not consider that potato-harvesting operations are likely to become much more highly mechanised in the near future and quotes the following reasons for his belief:—

(a) The majority of growers handle relatively small areas of potatoes in conjunction with other farming activities and to many of them the capital cost of specialised potato equipment is sufficiently high to make its purchase a doubtful economic proposition.

(b) These machines perform only a small part of the harvesting operation, viz., lifting the tubers to the surface. A considerable labour force is still required to pick up, grade and bag.

(c) In many areas seasonal workers are paid the same rate per bag for picking up, grading and bagging as for *digging,* picking up, grading and bagging. In the circumstances some growers have used mechanical diggers at added cost to themselves.

(d) Some makes are too light in construction and replacement parts difficult to obtain.

In conclusion, Mr. Bulcock writes:—

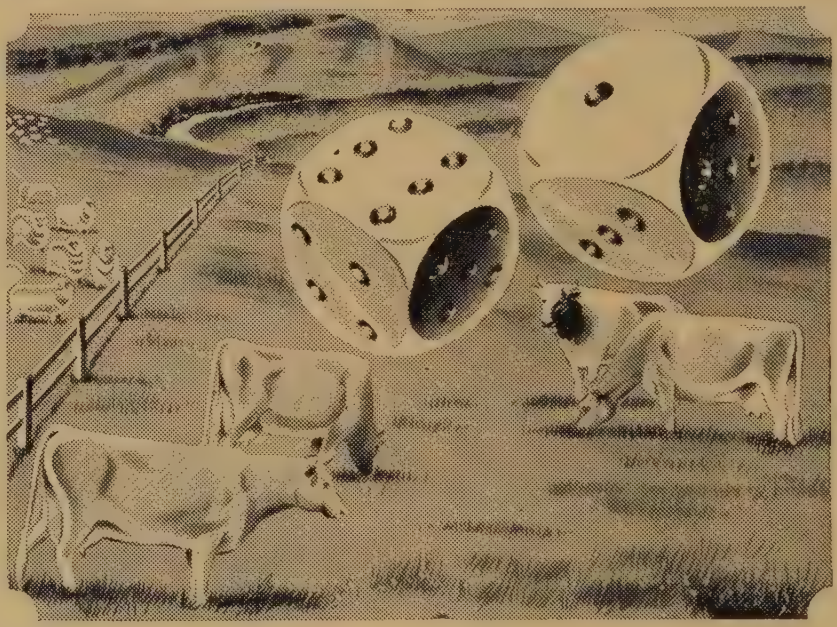
"I think the greatest single problem facing the potato growing industry today is a complex one related to agricultural economics, with the dominant factor being labour shortages. Farmers are obtaining satisfactory returns from other crops requiring a smaller labour force.

"Until a more suitable machine is proven, this Department is trying to facilitate an expended production of the elevator type digger which, of the machinery available, seems well suited to Australian requirements."

HINTS FROM THE OUTBACK

KERNELS from quandong and sandalwood nuts make good substitutes for hard-to-get almonds and walnuts, when the outback cook has to make cakes, puddings and lollies. Throw the shelled kernels into boiling water and boil for 15 minutes, then cut into quarters and use in place of other nuts in your favourite recipes. They are cheap and have a delicious flavour.

—COUNTRY COOK.



DON'T GAMBLE ON YOUR PASTURE!

Why risk poor growth of feed when good pasture means so much in the production of wool, meat and milk?

Sow the highest grade seeds best suited to your climate and Soil. And remember that we can offer expert advice FREE, if you need it. Another point . . . . Why risk not having your Seed on hand when you want it? Send us your order TO-DAY! Owing to possible shortage of some varieties you are recommended to have your order recorded without delay

SOME SEASONAL SUGGESTIONS FOR SPRING SOWING FROM OUR EXTENSIVE RANGE:—

SUDAN GRASS
RED MAIZE
RHODES GRASS
N.Z. WHITE CLOVER
LADINO WHITE CLOVER
SORGHUMS
COW PEAS
PERENNIAL RYE
LUCERNE
JAPANESE MILLET

Elder, Smith & Co., Limited

SEEDS SECTION

DAHLIAS

Lifting and Storing the Tubers

By F. JACKSON

An attractive Hybrid Cactus.

NOW that the flowering season for dahlias has finished, arrangements must be made for lifting and storing the tubers. Many losses occur each year during the dormant period and most of these are due either to carelessness or lack of knowledge. While the storage provided for dahlias during the winter months may be thoroughly satisfactory, tubers are often lost because of the treatment received by the plants during the growing period.

To use large quantities of poultry manure or other manures rich in nitrogen without regular light dressings of sulphate of potash is to court disaster. An ample supply of potash is essential for the thorough ripening of dahlia tubers and without it, the tubers are usually in a soft and watery condition when lifted and rarely keep for very long.

Another factor of importance is the time of lifting. Tubers that are lifted before they are sufficiently dormant often rot away before the next planting season arrives.

HINTS ON LIFTING

A method recommended for lifting and storing is as follows:—If possible wait until all life has gone from the foliage before making a start. In sandy soil it may be necessary to "wrench" the plant to stop growth. This is done by using a fork all round the plant. At a distance of about 10 in. from the stalk push the fork in to its full depth and then move the handle away from the plant. This action loosens the roots and about a week later lifting can be commenced.

Before lifting, all dahlia plants should be cut down to within 10 in. of the ground. This will give a stalk about a foot long after the tuber is lifted. The reason for this long stalk is to prevent water, snails and slugs from getting down the stalk into the crown of the clump. The stalk is much like a bamboo, being partitioned every few inches, and while the partitions may be thin they last long enough to be effective.

Tubers can be lifted now and a good fork is better for this work than a spade. Do not shake all the soil away from the crown of the clump after lifting. There are two good reasons why some of this soil should be left on the tubers. Firstly, soil packed tightly around the crown

SELL *us your*

OATS, RYE *and* CLOVER SEED

We are buyers and exporters of Oats, Rye and Clover Seed and will pay top prices for the right grades. Send an envelope sample to the local Barrow Linton agent in your district or direct to the head office in Perth. Oats may be consigned in bulk or bags

BARROW LINTON
COVERS THE COUNTRY

BUY *our famous*

BUMPA - KROP Pasture Seeds

For best results plant Barrow Linton's "Bumpa-Krop" pasture seeds. All are machine dressed and include the best strains of clover, rye grass, tick beans, field peas, etc.

Barrow Linton & Co.

Head Office: 763 Wellington St., PERTH
Silos and Grain Stores: CANNINGTON

YOU WOULDN'T

PLANT A SEEDLING APPLE TREE

WOULD YOU?

Then why plant a seedling Passion Fruit Vine

We have unlimited quantities of Grafted Vines as illustrated, and reasonably priced at 6/– each. Freight extra.

This is tree and shrub planting time, and we have large stocks to select from. Our list will be posted to you free. Please write for a copy

If you are in need of Farm seeds, Vegetable seeds, Flower seeds, Shrubs for your garden, Shade trees for the Farm, or any other Agricultural or Horticultural goods, please write to:—

WILSON & JOHNS PTY. LTD.

74 Barrack St., Perth :: Fremantle Branch, 102 High St.

VARIETY ADDS CHARM.

The vase at the top contains a tasteful array of the ever-popular Charms. Lower left is a collection of colourful Pompoms and on the right is a good Decorative bloom. These are but a few of the infinite varieties of shapes, sizes and colours which intrigue the dahlia enthusiast.

gives some stability and consequently fewer tubers get broken necks. Secondly, the soil acts as some protection when the young shoots emerge next season.

Do not think that this recommendation means that you must use some covering during the storage period and resort to the use of grass or bags. Such coverings only provide hiding-places for pests and it would be far better to leave the crowns entirely uncovered.

STORAGE SITES

Storage is easily arranged. Suitable places would be under a hedge, under an evergreen tree such as an orange or on the lee side of closed picket fences. Tubers should be laid on the ground and it is advisable to place them where they can be seen without trouble. A constant watch should be kept for insects and any that appear should be destroyed. Neither sun nor rain will damage the tubers but protection from frosts is essential. Draughty storage places should also be avoided.

The most common method of marking the varieties is to write the name on the underside of a couple of tubers in each clump, using an indelible pencil.

The following points are worthy of emphasis:—

Do not neglect to use sulphate of potash during the growing period.

Do not lift the tubers too early; wait until foliage is yellow.

Do not store in a box in a garage or shed or in a draughty place.

Keep the tubers on the ground so that the roots can function when ready to start growth.

Many hundreds of varieties of the several different types of dahlias are grown in this State and perhaps mention of a few of each type will be of some assistance to growers desirous of making a selection for next season.

GIANT DECORATIVES

Pop Harris.—Rich dark red.

Nobbys Light.—Medium yellow.

Miss Doris Brand.—Mahogany red and yellow.

Sunrise.—Rich golden yellow, shading to chrome at centre.

Croydon Snotop.—Pure white.

Croydon Masterpiece.—Dutch vermillion.

Kelvin.—Salmon pink flushed bright pink.

Lavette.—Lavender.

Croydon Radiance.—Bluish carmine.

Croydon Cyclamen.—Cyclamen pink, tipped salmon.

Pamela Mary Joyce.—Yellow.

Nymphea.—Lilac with cream shading.

A photograph does not do justice to the rich hue of the Decorative, Pop Harris.

GIANT HYBRID CACTUS

Beverley Robinson.—Deep lilac.

Mrs. C. H. Johns.—Rich yellow and chrome.

Conqueror.—Rich sulphur yellow.

Fernies Triumph.—Vivid scarlet.

Mountbatten.—Buttercup to old gold.

Shelbourne Sunset.—Red shades and gold.

Consul-General Quist.—Delicate shell pink.

Frau O'Bracht.—Creamy yellow.

Heart of Gold.—Orange, tipped gold.

Kelvin Pink.—Lilac pink.

Joan Black.—Light bronze shading to apricot centre.

Goulbourn.—Bronzy buff.

MEDIUMS (under 8 in.)

Eileen.—Pure pink.

Jersey Beauty.—Peach pink, very dark stems.

Brooklyn Coralie.—Coral pink to salmon rose.

Fernies Flame.—Bright red.

Olives Choice.—Rich pink, tipped gold.

Bunny.—Canary yellow.

Dulcie May.—Ox blood red.

Wm. E. Buckley.—Pink to creamy pink.

Golden Leader.—Golden yellow.

Water Lily.—Delicate pink, flushed cream.

Fernies Opal.—Cream overlaid opal pink.

Paul Pfitzer.—Salmon rose with salmon base.

CHARMS (not over 4 in.)

Tilburys Starlight.—Deep orange to old gold.

Barbara Lowery.—Creamy yellow overlaid carmine.

Delaware Royal.—Mauve pink.

Willie den Ouden.—Bright red with golden base.

Belle.—Bright yellow.

Chasamy.—Lolly pink with cream to primrose centre.

Kensington Fire.—Orange.

Palema Shaw.—Peach pink flushed buff.

Abbotts Snowflake.—White.

Cuddles.—Rich salmon with apricot shadings.

Black Jewel.—Blackish red.

Lorraine.—Gold, shaded orange.

POMPONS

Burwood.—Yellow, tipped scarlet lake.

Doria.—Dark portwine.

Brittains Delight.—Buff and primrose, tipped mauve.

Mrs. V. Brittain.—Mauve pink.

Margaret Williams.—Deep pink.

Little Willo.—White.

Rhonda.—Lilac.

Vashde.—White, tipped mauve.

Golf Ball.—Gold, tipped red.

Joyce Gibb.—Cream, tipped lilac pink.

Rosea.—Violet.

Edna Rumble.—Purple lake with silvery base.

FREE TO FARMERS

The "Journal of Agriculture, W.A.," is free to bona fide farmers whether they be pastoralists, wheat-growers, orchardists, graziers, dairy farmers, beekeepers or market gardeners.

Non-farmers may receive the Journal on payment of 5s. a year (six copies) or 1s. each for single copies.

Address requests to be placed on the mailing list to The Editor, "Journal of Agriculture," Department of Agriculture, Perth.

Mr. Farmer . . . .

PREPARE NOW!

★ **PLACE AN ORDER NOW FOR THE ARMSTRONG HOLLAND "BULLDOG" SCOOP AND SO BE READY TO START RIGHT INTO OPERATION JUST AS SOON AS THE WINTER IS OVER.**

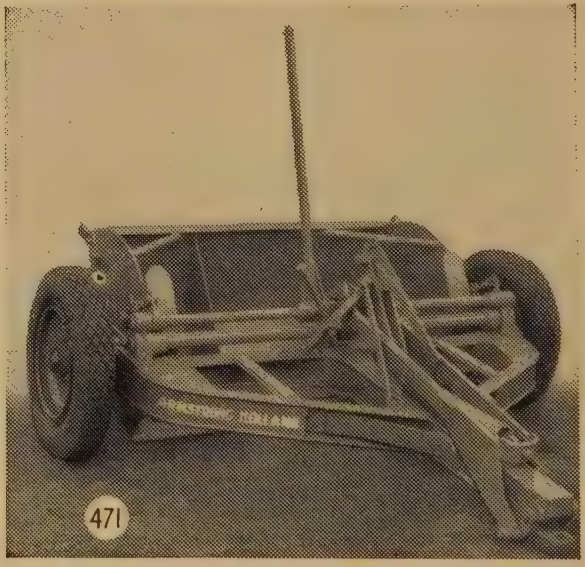
ARMSTRONG HOLLAND

The "BULLDOG" Wheel Scoop is an ECONOMY Scoop . . . It moves MORE dirt and SAVES fuel, time repairs, by carrying loads on pneumatic tyres

MODELS

	Bowl Width	Capacity cu. ft.
4SNP	4ft.	15-22
5SNP	5ft.	18-27
4HMP	4ft.	28-36
5HMP	5ft.	31-42
6HMP	6ft.	37-51

Made in Australia



★ **Illustrated above is the Pneumatic Tyred Automatic Tractor Scoop.**
WRITE FOR FULL PARTICULARS

W.A. INDUSTRIAL SALES & SERVICE Co. Ltd.

BELMONT AVENUE BELMONT

DISTRIBUTORS OF BETTER INDUSTRIAL EQUIPMENT

PHONES ML446, ML310, ML515. TELEGRAMS: "ANGLEDOZER"

PLANT YOUR ROSES CAREFULLY

A Few Hints for the Home Gardener

By C. C. HILLARY

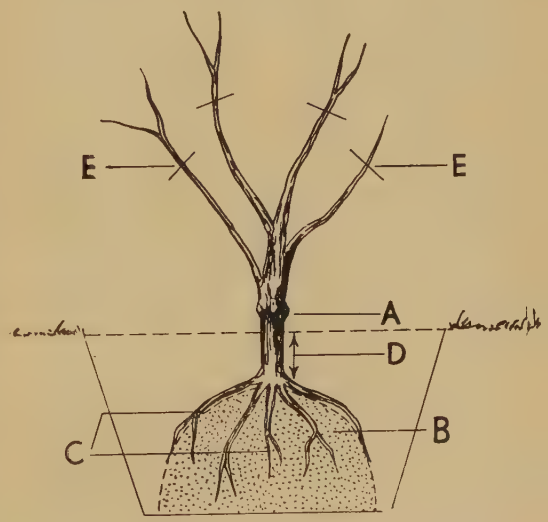
WHILE the planting of roses is a comparatively simple business, there are certain rules which must be followed if losses are to be avoided. Most of the roses sold by nurserymen in this State are raised on what is known as Fortuniana stock. The origin of this stock is somewhat obscure, but it is thought to be the result of a cross between Rosa banksia and Rosa laevigata. Whatever its origin, however, it is certainly a very vigorous stock and one which thrives better in the soils and climate of this State than any other. A further advantage is its compatability, that is, the ready way in which it unites and grows in harmony with most other hybrid tea and hybrid polyantha roses.

But although it is the most suitable stock for local conditions, it has two serious disadvantages. It is difficult to strike, and it does not transplant so readily as most other stocks. The difficulty of striking the cuttings is mainly the concern of nurserymen and will not be dealt with here, but the difficulty of transplanting roses growing on Fortuniana stocks concerns every grower of roses, whether amateur or professional.

The principal reason why roses budded on Fortuniana stocks are difficult to transplant, is that the stock rarely becomes fully dormant during winter. Except in the very coldest localities, there is always some growth and, on plants which are left unpruned, often some flowers as well. This means that the roots also continue in action and roots that are active suffer considerable shock when lifted from the soil and exposed to the air. If the roots are exposed for any length of time, the shock is even greater, and if at the same time they are subjected to the action of wind or sun, or both, the shock is often so great that it causes the death of the plant.

PROTECT THE ROOTS

It should be obvious from this, therefore, that the utmost care must be taken to protect the roots as much as possible from the time they are lifted in the nursery until they are tucked away snugly again in their new soil homes. Wrappings of some kind should be placed around the roots as soon as the plants are lifted and left there until such time as they are planted again.



A ROSE-BUSH CORRECTLY PLANTED

A—Union about 1in. above ground level.

B—Mound of clean, unmanured soil.

C—Roots draped evenly around the mound.

D—Distance of 4in. from topmost root to ground level.

E—Top growth shortened back where indicated.

Another cause of loss is loose planting. No rose root will grow again if it is left suspended in a pocket of air. Firm planting is essential and plenty of fine earth should be packed around and in between the roots. It is also advisable to go over the young roses a couple of times after planting to make sure that the soil around the plants is well trodden down.

PRUNING PAYS

The transplanting will also be helped considerably if the top growth is pruned hard back as soon as the roses are planted. However carefully roses are lifted in the nursery, there is always a big loss of roots. Until such time as the new roots are functioning, the rose must live on itself and the less top hamper there is the less the drain on the plant. The shortening of the top growth also reduces the area of wood exposed to the drying action of sun and wind—a factor of serious consequence to any young rose before it has put forth new roots.

Before planting any rose, cut off all damaged roots and remove any sucker eyes that may be showing on the stem below the union of the scion with the stock. Having treated the roots, the top growth should be shortened to balance the loss of roots. First remove completely all unripe shoots and twiggy growths. Then shorten the remaining shoots by at least half their length. Next remove any leaves that may remain on the plant, cutting them off close to the stem, and pare off with a sharp knife any surplus wood at the junction of the scion and stock so that it will quickly callus over.

For the actual planting, open up holes about a foot square and a foot deep. In the bottom of each hole, using clean, unmanured soil, form a mound (after the style of an inverted basin) with its apex where the stock of the plant is to rest. The top of the mound should be low enough to permit of the rose being planted about four inches deep, measured from the topmost root to the ground line.

Next, take the rose selected for the first hole and place the base of the plant on top of the mound, spreading the roots as evenly as possible around and down the sides. Then, using clean unmanured soil, half fill the hole, pressing the soil firmly in between and around the roots to exclude the air-pockets. A bucket of water should then be poured into the hole to help the further settlement of the soil around the roots. The planting of all the roses can then be completed to this stage, and later in the day, after the water has drained away, the holes can be filled to the top with soil, which should be well firmed around the plants.

A summary of the principal rules which should always be observed during the planting of roses, is as follows:—

(1) Do not leave the bundle of plants lying about with the roots exposed; keep them covered, taking one plant only at a time for planting.

(2) Never allow manure to come into actual contact with the roots.

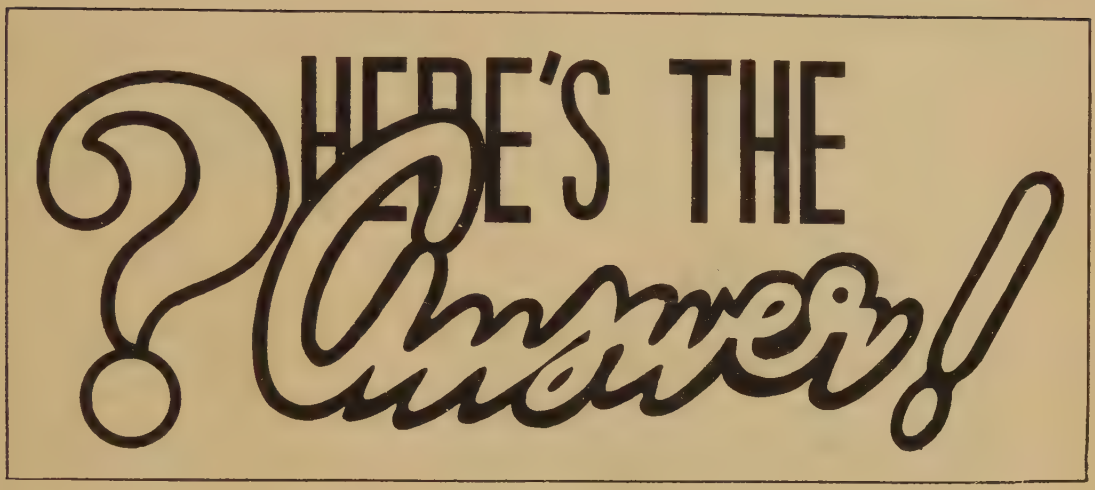
(3) Do not plant too deeply. Four or five inches measured from the topmost root to ground level is quite deep enough.

(4) Plant firmly.

(5) If shoots have grown from one side of the plant only, place the rose in the ground with the shoots pointing towards the south; the sun will soon encourage the formation of growth on the northern side of the plant.

(6) Do not plant your roses too closely together; allow three feet between the moderate growers and four feet between those that are vigorous.

(7) Keep the young plants well supplied with water, even in winter, if the rainfall is light.



TOBACCO GROWING

What are the main conditions suitable for growing tobacco in Western Australia?

All the tobacco produced in Western Australia at the present time is grown in the lower South-West of the State, in areas around Manjimup, Northcliffe and Karridale.

Requirements for the growing of tobacco are firstly, a suitable climate. It must be remembered that tobacco is one of the few crops grown in which the actual leaves are harvested as the commercial product. Therefore, strict attention must be paid to this factor.

Tobacco needs a humid atmosphere in which to develop the various qualities such as aroma and texture which make a leaf of desirable smoking quality. Another important climatic factor is that, once planted in the field the growth of the plant must be rapid and without check.

Requirements in this case are a moderately high temperature and sufficient moisture. Under irrigation, one inch of water is required each week. In the South-West, the crops survive on natural seepage moisture.

After climate, soil is the important factor. A light sandy loam soil is required—pure sands and clays are, in general, unsuitable. The clay subsoil should not be closer than nine inches to the surface. The most desirable depth is about 15 inches.

Many inquiries are received from people who wish to grow plants for their own use. Besides being inadvisable from the point of smoking quality, this practice is illegal. Tobacco is an excisable commodity and must be grown under license and marketed through a registered broker.

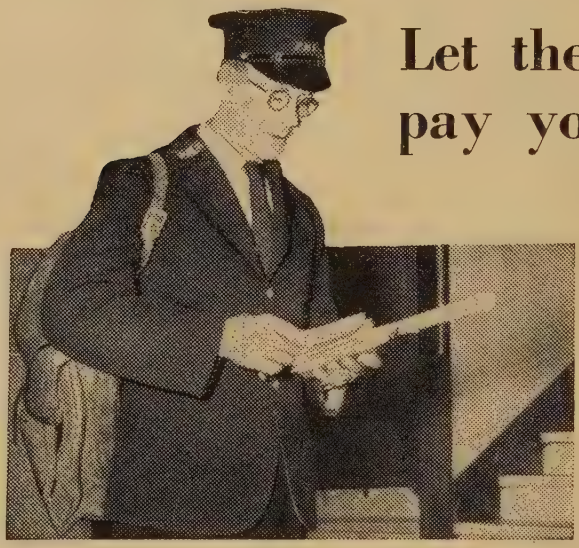
CROSS-POLLINATION OF FRUIT TREES

Do fruit trees other than almonds need cross-pollination?

Other fruit trees which need cross-pollination for the successful setting of crops are apples, plums, cherries and some pears. Most other fruits will set satisfactory crops without the aid of cross-fertilisation.

Generally speaking any two varieties of the one fruit flowering at the same time will act as pollinators one for the other. In selecting varieties of the above fruits for planting therefore provision must be made for pollinators.

In the case of Japanese plums some varieties will set fruit without cross-pollination, but crops are better and surer if cross-pollination is provided.



Let the Postman pay your bills!

Paying by cheque saves time and expense. It is more convenient, much more business-like and greatly reduces the risk of loss or theft. Have these benefits by opening a Cheque Account with any branch of the "R and I." An inquiry will place you under no obligation

Open a Cheque Account with . . .

The R&I Bank

RURAL & INDUSTRIES

Guaranteed by the Western Australian Government.

RURAL & INDUSTRIES BANK OF WESTERN AUSTRALIA

HEAD OFFICE: 555-573 Hay Street, PERTH
Branches at 6 Forrest Place, Perth; 14 Market Street, Fremantle,
and in leading country towns throughout Western Australia.

It is not essential to plant trees of the pollinator variety by grafting. It is possible to introduce a small portion of the pollinator variety into the existing tree or alternatively flowers of the pollinator variety may be placed in the tree at blossoming time.

FRUIT TREES FOR THE GREAT SOUTHERN

What varieties of fruit trees do you recommend for planting as a household orchard in the Great Southern farming areas?

This country is most suited to stone fruits and in some situations to apples and pears. Citrus fruits will not prove very successful in most parts because the winter is too cold and summer irrigation is not usually possible.

Among stone fruits the following are considered good varieties to plant.

Apricots—

Newcastle early (Early).
Royal (Mid-season).

Peaches—

Dunhelm or Edward VII (Early).
Ruby Red (Early Mid-season).
Blackburn or Elberta (Late).

Plums—

Santa Rosa (Early).
Wickson (Mid-season).
Satsuma (Late).

Apples will grow moderately well provided they are planted on a friable type of soil with a clay subsoil. Pears may be planted in a wetter situation.

A selection of apple varieties could be made from the following.

Gravenstein—(Early).
Dunns—(Cooking variety).
Cleopatra—(Early Mid-season).
Jonathan—(Early Mid-season).
Delicious—(Early Mid-season).
Golden Delicious—(Mid-season).
Granny Smith—(Late Mid-season).

Suitable pears are:—

Bartlett.
Packhams Triumph.

Where conditions are suitable a selected planting could be made from the following citrus fruits.

Oranges—

Washington Navel.
Valencia.

Lemons—

Eureka.

Mandarins—

Emperor or Imperial.

Grapes prove successful for home growing throughout most of the Great Southern districts and the following could be used as a basis of selection.

Early Madeline—(Early).
Muscatel—Alexandria or Gordon—(Early).
Waltham Cross—(Early).
Wortley Hall—(Late).
Red Prince—(Late).

WEBWORM

I am told that it is risky to grow wheat in the Clackline district unless the ground has been worked up first and left for 10 to 14 days before sowing with the wheat crop. Old residents told me that if the ground is sown immediately after working there is a chance that much of the crop will be eaten by grubs. I have grown wheat for a number of years in the North-Eastern wheatbelt without encountering this trouble. Would these "grubs" be the larvae of the webworm moth described in a recent issue of the Journal.

It is probable that the grubs are the caterpillars of the webworm moth and ploughed in wheat crops are liable to webworm injury in almost any part of the wheatbelt, the amount of damage sustained depending upon seasonal conditions.

Investigations recently carried out have shown that early ploughed in crops are less liable to damage than those ploughed in later in the season and that where it is possible to plough and then delay planting for a fortnight or three weeks, the likelihood of damage from the caterpillars is further reduced.

STORING COMBS

I have a number of drawn combs which the bees will not require during the winter, but which may be urgently needed next spring. I fear that if I store them without some protection the wax moths will ruin them. I understand that certain chemicals may be obtained which act as fumigants and I would like to know the names of these chemicals and where they could be obtained.

There are several methods by which combs may be stored with reasonable safety and a short description of the methods of fumigation is given below:—

1. *Para-di-chlor-benzene Crystals:* An empty super is placed on the ground and about a ¼ lb. of PDCB crystals is placed inside it. The other supers filled with the drawn combs are then stacked above it. About a thimbleful of crystals should be sprinkled over the top bars of each super. When all the supers are stacked the cracks between them should be sealed with gummed paper to make the stack as gas-tight as possible, and to prevent re-introduction of wax moths from outside.

2. *Carbon-tetra-chloride,* and *Carbon-bi-sulphide:* These are liquids giving off a poisonous gas heavier than air. The supers should be stacked as before and sealed with gummed paper to make the stack as gas-tight as possible. A saucerful of the liquid is then placed on top of the stack and a lid fitted down and gummed with paper. The gas, being heavier than air, then percolates down through the stack.

Fig. 1.—Fumigating against wax moth. Supers containing combs are stacked up and all crevices sealed with gummed paper to make as gas-tight as possible. A saucerful of fumigant is placed on the top of the stack and another super is put on, together with a lid. All extra crevices are then sealed. (See article, "Storing Combs.")

Fig. 2.—Combs may be kept reasonably free from wax moth for short periods by standing the supers on end so that the wax is exposed to light and air.

Remember that carbon-bi-sulphide is a poisonous explosive substance, and therefore should be treated with every respect. Carbon-tetra-chloride is non-explosive, and is the one recommended.

If it is intended to store the combs for a lengthy period it is wisest to refumigate four or five weeks later, to ensure that all the moths are accounted for.

Wax moths prefer darkness, and if storing the combs for only a short period it will be found that if the supers are left outside exposed to the sunlight and air the moths will give little trouble. The boxes are then stacked vertically on their ends to give a maximum of exposure.

If you are planning to keep bees commercially, it may be worth your while to construct a proper gas-tight chamber using any of the substances mentioned above as a fumigant. They are obtainable from any of the large wholesale druggists in Perth.

HIVING A SWARM

There are a number of bees in hollow trees in this area and swarms are fairly common. What is the best way to capture and hive a swarm?

Methods will vary somewhat according to the spot where the swarm is situated. Where the bees are considerate enough to settle on a branch about four feet from the ground it is a simple matter. Just shake them into a suitable box about the size of a butter-box and convey them immediately to a prepared hive in the apiary.

The hive should preferably contain some frames of brood taken from another hive, together with some drawn combs or foundation comb. Place a board or a half-sheet of asbestos sloping up to the hive entrance, shake the bees on to this from the box and coax them to run up into the hive by a few gentle puffs of smoke. As soon as they realise that here is a new home containing brood they will generally move in without any hesitation. By this method it is usually possible to see the queen and make sure that she goes into the hive.

Where a swarm is well-situated one can even short-circuit this method by shaking the swarm directly into a prepared hive and putting the hive in position in the apiary. In this case it is advisable to remove the eight centre frames from inside the hive, having one frame against each of the side walls.

If the swarm settles on a high branch a butter-box can be attached to a long pole and held under the branch which is then shaken by means of another pole with a hook on the end.

Where the swarm cannot be shaken down—for instance, if it is situated in a dense, thorny bush—try inverting the box over the position and placing a wide board leading up into the box. Smoke is used to drive the bees upward into the box.

FARMERS

This is YOUR Journal, and it has been written, edited and presented in a sincere endeavour to give you helpful information in an interesting manner.

We would like to have your views on the Journal—to know whether you like it or whether you don't. Drop a line to the editor and tell him the features you like and don't like in this issue—or the features you hope to see in future issues.

For FARM and STATION

DENNIS MOBILE CIRCULAR POWER SAW

★ **The only Power Saw that can offer a 360° turn combined with Patent Height adjustment.**

★ **The DENNIS saws are manufactured in two sizes to meet the demands of all users, but both models incorporate the patented features which are exclusive to these machines. MODEL 30 fulfils the need for a light, easily-handled machine for firewood cutting, clearing and general utility work around the farm and station, while MODEL 36 is a heavy duty machine built to stand up to the exacting demands of the timber industry and has the ability to give long service under extremely arduous conditions, yet is light and, with the aid of its efficient power drive to the road wheels, can be handled in rough country with the greatest of ease.**

Factory Service and Parts always available from the Manufacturer

WRITE FOR A FREE BROCHURE NOW

WE ALSO DESIGN AND MANUFACTURE

TRAILERS OF ANY TYPE OR CAPACITY

SEMI, FOUR WHEEL, LOW LOADERS, TIMBER JINKERS, FARM TRAILERS

AXLES FROM 10 CWT. TO 10 TONS

BRAKING SYSTEMS IN MECHANICAL, VACUUM, PRESSURE OR HYDRAULIC

All Classes Engineering - Metal Spraying for Worn Parts - Welding in all Branches

W. SCHULSTAD *ENGINEERS*

26 HARDY ROAD, MAYLANDS

Obituary

The late Mr. E. T. Morgan

THE West Australian Department of Agriculture lost one of its stalwarts on May 2, when Mr. Edward Thomas Morgan, Officer-in-Charge, Vegetable Branch, died at his South Perth home after a brief illness. Mr. Morgan, who was 57 years of age, had been a member of the staff of the Department since 1928 and had been in charge of the Vegetable Branch for 20 years.

Born in Herefordshire, England, "Ted" Morgan came to this State as a youth and joined his brother at Burekup. His interest in potato-growing commenced at that period as the brothers were among the pioneer growers in the Benger Swamp, and the experience gained there proved invaluable when he joined the Department of Agriculture as a Vegetable Inspector.

During visits to farms he was always ready to doff his coat and give practical demonstrations, and growers still talk of his skill with a plough. He soon became Chief Inspector of the Potato Branch, and his keenness in augmenting the work of his predecessor, the late Mr. G. N. Lowe, resulted in the average yield per acre of potatoes in this State being increased by 25%, putting Western Australia's average well ahead of that of the other States.

He was the first to demonstrate a copper deficiency in southern soils, a discovery that led to widening of the areas of land available for potatoes.

During World War II he was an official adviser on vegetable production and was in constant touch with American officers responsible for the victualling of their Army and Navy units. Friendships established during those years endured till the time of his death.

As chairman of the Potato Marketing Board of W.A., and a member of the Onion Board since its inception, "Ted" Morgan did splendid work. He represented Western Australia in the Eastern States on all business connected with potato production.

A man of keen intellect and wide practical experience, Ted was a good mixer. He had a seemingly inexhaustible fund of good stories which he told well, and was a witty and interesting speaker.

As a relaxation he bred and grew gladioli and attained international repute in this field. His variety "Dark David" won a championship in a large American show and he achieved many triumphs at Australian shows. A past president of the Gladiolus Society he was a recognised judge of his favourite flower.

Ted has passed on but his influence will endure for many years in this State. He will long be remembered by many friends, young and old, in all walks of life.

Ready-mixed—

—ready-to-use—

Ready-for-drenching

Elliotts

PHENZEEN PLUS

THE ORIGINAL LIQUID PHENOTHIAZINE DRENCH

This all-season drench is effective against a wide range of stomach and intestinal worms in sheep and cattle of all ages. PHENZEEN PLUS comes ready-mixed and ready-to-use. It ensures maximum results with an exceptional margin of safety. It controls both mature and immature worms and inhibits the development of worm eggs.

OBTAINABLE FROM STOCK AND STATION AGENTS, STOREKEEPERS AND CHEMISTS

WHOLESALE DISTRIBUTORS

FELTON, GRIMWADE & BICKFORD PTY. LTD.

297 MURRAY STREET, PERTH.

ELLIOTTS RURAL LABORATORIES, Elliotts & Australian Drug Pty. Ltd.

Departmental Leaflets and Bulletins

DEPARTMENTAL publications listed hereunder may be obtained free of charge (except where a price is indicated) on application to the Officer in Charge of Departmental Publications, Department of Agriculture, St. George's Terrace, Perth.

DAIRYING

Leaflet No.

419. Chart Showing Butterfat Price Given Wholesale Price and Charges.
550. Butterfat Tables (1s. per copy).
851. The Babcock Test.
911. Herd Recording Results as a Comparison with Factory Returns.
959. Grade Herd Recording 1947-48.
960. Can Washing Machines and their Operation.
965. Cost of Feeding Cows Under Official Pure-Bred Recording Scheme 1947-49.
967. Composition of Milk (A Preliminary Investigation into the Seasonal Trend).
968. Cooling of Milk on Dairy Farms.
970. Butterfat Ready Reckoner.
971. Artificial Insemination and its Possibilities for Herd Improvement.
972. Rate of Milking with Machines.
976. Better Dairying Competition 1946-49.
982. Influence of Month of Calving on Production.
986. Influence of Month of Calving on Length of Lactation and Average Yield of Butterfat.
987. The Farm Separator and Variation of Cream Tests.
990. Grade Herd Recording.
1000. Rate of Milking with Machines—Some Further Results.
1011. Cost of Feeding Cows Under Official Pure-Bred Recording Scheme 1948-49.
1016. Better Dairying Competition 1949-50.
1026. Better Dairying Competition 1950-51.
1034. Influence of Grazing Green Oats on Butterfat Content of Milk.
1036. Grade Herd Recording 1949-50.
1050. Register of Merit.
1055. Cost of Feeding Pure-Bred Dairy Cows, 1949-50.
1059. Dairy Herd Improvement Scheme 1950-51.
1064. Pig Raising as an Adjunct to Dairy Farming.
1067. Reproductive Efficiency of the Dairy Cow.
1069. Phosphorus Supplements for Dairy Cows.

CATTLE

611. Breeding Tables.
623. Coast Diseases.
650. Toxic Paralysis (Botulism).
650a. Inoculation of Stock with Vaccines.
674. Milk Fever.
689. Copper Deficiency and Falling Disease.
739. Whey for Calves and Pigs.
757. Dehorning.
760. Vitamins.
787a. Mastitis—Prevention and Control.
832. Brucellosis (Contagious Abortion, Bang's Disease).
844. Photosensitisation.
873. Acetonaemia (Acidosis, Ketosis).
874. Animal Breeding.
875. Strain 19—In the Control of Contagious Abortion.
897. Tetanus in Farm Animals.
942. A Crush for the Tubercular Testing of Cattle.
952. Mastitis—Treatment.
954. Phosphorus Supplements for Dairy Cows.
957. Urea Feeding Trials (Denmark 1947).
963. Blackleg in Cattle.
992. Phosphorus Deficiency in Dairy Cows.
1015. Footrot (Foul Foot) of Dairy Cattle.
1043. Redwater (Leptospirosis).
1042. Genetics and Animal Breeding.
1058. Tuberculosis.
1080. Recent Advances in Veterinary Medicine.
1085. More Beef from the Kimberleys—Part 1.
1095. Strain 19 in Western Australia.

SHEEP AND WOOL

335. The Export Lamb (1s. per copy).
611. Breeding Tables.
623. Coast Disease.
650. Toxic Paralysis (Botulism).
650a. Inoculation of Stock with Vaccines.
656. Infectious Entero-Toxaemia (Braxy-like Disease, Pulpy Kidney).
665. Pregnancy Toxaemia of Ewes.
668. Footrot.
679. Worms.
682. Stringy Wool and Copper Deficiency.
686. Arthritis in Lambs.
713. Copper Deficiency in Sheep.
760. Vitamins.
763. Mycotic Dermatitis (Lumpy Wool) and Fleece Rot.
830. Caseous Lymphadenitis (Cheesy Gland).
831. Swelled Head in Rams.
844. Photosensitisation.
858. Cystic Tapeworms (Bladder Worms).
874. Animal Breeding.
883. Contagious Ophthalmia (Pink-Eye).
895. Flock Establishment and Improvement.
897. Tetanus in Farm Animals.
917. Studies in Sheep Husbandry.
930. Export Lambs—Grading Standards.
944. Classing Farmers' Clips for Auction.
950. Sheep Itch Mite.
974. Clover Disease—Practical Findings and Recommendations for Control.
981. Lice and Tick.
984. Sheep Shearing Technique.
985. Urinary Calculi.
1056. Hypocalcaemia (Milk Fever, Grass Tetany).
1075. Grinding Combs and Cutters and the Maintenance of Handpieces.
1091. Crutching Technique.
1098. Swelled Head in Rams.

PIGS

611. Breeding Tables.
739. Whey for Calves and Pigs.
755. Self Feeders in Pig Raising.
760. Vitamins.
807. Pig Management—Questions and Answers.
813. Sarcoptic Mange of Pigs.
842. Infectious Pneumonia of Pigs.
844. Photosensitisation.
860. Suppurative Otitis in Pigs.
897. Tetanus in Farm Animals.
907. Profitable Pig Raising.
975. Baconer Carcase Competition.
1002. Swine Paratyphoid.
1013. Bacon Carcase Competition 1949.
1037. Baconer Carcase Competition 1950.
1053. Worms in Pigs.
1058. Tuberculosis.
1064. Pig Raising as an Adjunct to Dairy Farming.

POULTRY

Leaflet No.

607. Pullorum Disease of Chickens.
876. Produce and Market First Quality Eggs.
888. Rearing of Chickens.
904. Perching.
931. Laryngo-Tracheitis.
940. Requirements in Designing the Layout and Buildings for a Poultry Farm.
949. The Culling of Poultry for Egg Production.
991. Muresk Egg Laying Trial—No. 19.
995. Nutritional Requirements of the Domestic Fowl.
999. Coccidiosis of Fowls.
1010. Geese.
1035. Raising Turkeys.
1041. Control of Intestinal Round Worms in Poultry.
1057. Muscovy Ducks.

HORSES

417. Determination of Age in the Horse.
611. Breeding Tables.
650. Toxic Paralysis (Botulism).
650a. Inoculation of Stock with Vaccines.
760. Vitamins.
844. Photosensitisation.
874. Animal Breeding.
897. Tetanus in Farm Animals.
1071. Internal Parasites of the Horse.

BEE-KEEPING

697. Introduction of Queens.
740. Management of an Apiary.
815. Pollen and Pollen Substitutes.
829. Migrating Bees.
859. Simple and Efficient Method of Rearing Queens.
861. Main Honey Producing Flora of W.A.
1005. Bee Combs—Their Preparation and Manipulation.
1046. Bees Act, 1930-1950—An Explanation.
1083. Bees in Box Hives.
1086. Preparing Beeswax for Market.

VEGETABLES

292. Cultivation of Onions.
323. Leguminous Crops.
522. Rhizoctonia and Common Scab of Potatoes.
552. Bacterial Blight in Beans.
586. Pure Cultures Obtainable from Plant Pathology Branch.
715. Fusarium Wilt of Tomatoes.
719. Bean Rust.
721. Blossom End Rot of Tomatoes.
732. Black Spot and Stem Rot of Peas.
733. Mosaic of Peas and Broad Beans.
734. Chocolate Spot of Broad Beans.
752. Vegetable Seed Production—Cross Pollination.
759. Black Rot of Cabbage, Cauliflowers and Related Plants.
777. Vegetable Growing (2s. per copy).
793. Tomato Culture in the Geraldton District.
814. Potatoes—Use of Tuber-Unit Plots in the Cultivation of Seed.
817. Bean Mosaic Menace.
865. Vegetables—Selecting for Seed Production.
867. Bacterial Canker of Tomatoes.
915. Late or Irish Blight of Potatoes.
945. Root-Knot or Eelworm Gall Disease—Control by Soil Fumigation.
1024. Bordeaux Mixture.
1030. Grading of Potatoes.
1044. Vegetable Seed Treatments.
1063. Westralia Pole Bean.

FRUIT (other than Grapes)

20. Pruning of Fruit Trees (2s. 6d. per copy).
46. Fruit Packing, Marketing and Exporting (1s. 6d. per copy).

Leaflet No.

191. Citrus Pit.
192. Armillaria Root Rot.
219a. Bitter Pit Investigations.
219b. Bitter Pit—Occurrence in Store in Relation to Date of Picking.
319. Cape Gooseberry.
380. Black Spot or Scab of Pears.
306. Black Spot or Scab of Apples and Pears.
406. Passion Fruit.
513. Refurnishing Fruit Trees.
536. Bordeaux Mixture for Home Gardeners.
542. Papaw or Papaya.
553. Leaf Rust of Stone Fruit.
563. Compulsory Fruit Fly Baiting.
608. Apple Tree Pruning.
653. Citrus Growing.
672. Grey Mould or Botrytis Rot of Apples.
677. Water Spot of Navel Oranges.
764. Preservation of Fruit in the Home.
818. Sclerotinia Twig Blight of Oranges.
833. Citrus Tree Pruning.
863. Withertip of Apples.
886. Leaf Spot Disease of Black Mulberry.
889. Banana Culture.
912. Incinerator for Destruction of Fruit.
935. Apple Scab Outbreaks 1947-48—Introduction on Infected Buds in Nursery Stock.
945. Root Knot or Eelworm Gall Disease—Control by Soil Fumigation with D.D.
1024. Bordeaux Mixture.
1028. Notching of Dormant Buds on Apple Trees.
1068. Storage of Stone Fruit.
1089. Brown Rot of Citrus.
1090. Collar Rot (Brown Rot Gummosis) of Citrus.
1092. Novel Farm-made Spray for Fruit Fly Baiting.

GRAPES AND WINE

327. Wine Making for Domestic Purposes.
412. Vine Pruning.
979. Powdery Mildew or Oidium of Grapes.

TOBACCO

329a. Downy Mildew on Wild Tobacco.
329b. Downy Mildew Outbreaks near Perth.
664. Tobacco Seed-Bed Management.
1049. Tobacco Seed-Beds.
1065. Cultivation of Tobacco in Western Australia.

PASTURES AND FODDERS

323. Leguminous Crops.
497. Tangier Pea.
544. Inoculation of Tangier Peas.
546. Pasture Development.
582. Pasture Development—Third Year's Results of Species Trials Under Controlled Grazing in Irrigated Areas.
584. Subterranean Clover—Influence of Methods of Planting on Establishment.
586. Pure Cultures Obtainable from Plant Pathology Branch.
591. Phalaris Tuberosa (Toowoomba Canary Grass).
592. Tangier Pea.
599. Meadow Hay.
600. Elephant Grass or Napier's Fodder.
601. Sowing of Pasture Seeds.
602. Small-Seeded Horse, or Tick Bean.
627. Pasture Development.
632. White Clover.
634. Lucerne Growing in W.A.
678. Copper Content of W.A. Pastures—A Survey.
691. Pasture Development.
692. Pasture Development—Part III.
708. Early Sub-Clover Pastures for Areas of Medium Rainfall.
738. Dairy Produce Board Species Trials 1943.
798. Cow Peas.
819. Paspalum Grass.
821. Mechanisation of Fodder Conservation.
840. Greater Birdsfoot Trefoil.
902. "Yarloop" White-Seeded Subterranean Clover.

PRIMARY PRODUCERS!

Railway wagons are YOUR assets

DON'T WASTE THEM

PROMPT LOADING and UNLOADING means quicker turnround of wagons.

QUICKER TURNROUND means increased effective wagon loading capacity.

INCREASED CAPACITY means faster and better railway service for all.

BETTER SERVICE is our aim and **your** need. YOU CAN HELP yourself by helping Railways to keep the wagons moving.

★ USE Government Railways **Insured Parcels** and **Cash on Delivery Parcels** systems
★ ALSO, consign your goods at "Commission's Risk" and safeguard yourself

WESTERN AUSTRALIAN GOVERNMENT RAILWAYS

I buy my Poultry Feeds on RESULTS!

YES !
I feed "THOMAS" 16% Protein Laying Mash No. 1 as an ALL-MASH—WITHOUT any wheat—and obtain "MAXIMUM" egg production, because I can RELY on "THOMAS" Feeds (which are constantly analysed in Thomas and Co.'s chemical laboratory). I also use "THOMAS" 18% Protein CHICK STARTER (for my chickens from day-old to 8 weeks) and "THOMAS" 15% Protein CHICK GROWER (from 8 weeks to maturity). No "home-mixing" of cheap rations for me—I'm all for "high-quality" "THOMAS" Mashes.

INSIST ON "THOMAS" BRAND

"Thomas" QUALITY POULTRY FOODS

Further particulars from

W. THOMAS & CO. (W.A.) LTD.
FLOUR AND FEED MILLERS, COTTESLOE

Leaflet No.

908a. Phalaris Tuberosa.
910. Leguminous Seeds—Composition and Food Value.
938. Kikuyu Grass.
945. Root Knot or Eelworm Gall Disease—Control by Fumigation with D.D.
966. Sunflowers.
989. Grain Sorghum Trials (Denmark Research Station).
1012. Vetch Cultivation in the Wheat Belt.
1031. First Early Subterranean Clover.
1054. Paspalum Vaginatum.
1082. Elephant Grass.
1084. The Composition of Dwalganup Sub-clover.

GRAIN CROPS

121. Mildew, Septoria and Leaf Spots of Cereals.
126. Stem Rust of Wheat and Barley.
228. Root-Rot, Foot-Rot and Take-All.
375. Barley Smuts.
379. Frost Injury of Wheat.
509. Take-All and Similar Diseases of Wheat.
613. Composition of Wheat and Oats.
745. Maize for Grain.
768. Stem Rust of Wheat—Control by Breeding Resistant Varieties.
841. Wheat Breeding in Australia—Recent Developments.
881. New Cereal Varieties in Australia.
885. Handling Feed Wheat in Bulk.
945. Root-Knot or Eelworm Gall Disease—Control by Soil Fumigation with D.D.
946. Stem Rust of Wheat—Autumn Rainfall in Relation to Spring Epidemics.
953. Yield and Flour Strength of Wheat—Influence of Rotations On.
961. Oats in the Wheat Belt.
980. Pedigree Seed Production.
989. Grain Sorghum Trials (Denmark Research Station).
998. Wheat Variety Trials on Research Stations.
1018. Maize.
1038. A Review of the Application of Statistical Techniques to Wheat Agronomy in Australia.
1081. Cereal Variety Trials, 1951.

OIL-SEED AND FIBRE CROPS

641. Flax for Fibre.
765. Soybean—Inoculation Experiments.
799. Broom Millet.
854. Flax and Linseed Breeding.
855. Flax Rust.
872. Flax Seed Treatments.
877. Soybean—Its Possibilities in W.A.
966. Sunflowers.

SOIL HUSBANDRY, MANURES AND PLANT NUTRITION

271. Seaweed as a Fertiliser.
323. Leguminous Crops and Soil Fertility.
508. The Ph. Scale.
586. Pure Cultures Obtainable from Plant Pathology Branch.
662. Legumes for Conserving Nitrogenous Fertilisers.
671. Compost.
679a. Legumes for Green Manuring.
695. Farm Manure.
710. Superphosphate Requirements for Wheat.
750. Soil Moisture Conservation in Vineyards and Orchards.
800. Pre-Harvest Drop of Apples—Spraying.
803. Copper Deficiency in the Busselton District with Reference to the Establishment of Subterranean Clover.
827. Copper Fertiliser.
843. Cobaltised Superphosphate.
854. Phosphatic Fertilisers—Experiments.
866. Manganese Deficiency of Apple Trees.
878. Fertilisers for Lettuces at York.
908. Soil Conservation and Farming Practice.
918. Handy Aid to the Clearer.
927. Copper Deficiency of Cereals.

Leaflet No.

936. Zinc Deficiency of Flax.
947. Soil Conservation—Wind Erosion.
951. Pre-Harvest Drop of Apples and Pears.
955. Soil Conservation—Water Erosion.
956 Molybdenum for Preventing Whiptail in Cauliflowers.
958. Soil Types—Margaret River District.
969. Zinc, Phosphate and Copper—Responses of Oats on Newly-Cleared Light Land.
982. Fertiliser Trials on Annual Pasture (Wokalup Research Station).
996. Zinc for Subterranean Clover at Kendenup.
997. Molybdenum—Regeneration of Subterranean Clover Pastures.
1003. Salt Problem in the Wheatbelt.
1004. Windbreaks and Shelter Belts in Relation to Soil Erosion.
1045. Pre-Harvest Drop of Washington Navel Oranges —Spraying.
1052. Soil Salinity Investigations.
1054. Paspalum Vaginatum.
1072. Control of Clearing.
1074. Kimberley Soils Need Phosphates.
1079. Soil Conservation in Western Australia.
1093. Cobalt.
1094. Water Erosion Control—1.

WATER SUPPLIES AND IRRIGATION

220. Irrigation.
1009. Water for Agricultural Purposes in W.A.
1066. An Automatic Windmill Shut-off.
1073. More Automatic Windmill Shut-offs.

INSECTS, SNAILS AND SLUGS

106. Red-Legged Earth Mite.
122. Codlin Moth.
179. Green Tomato Bug and an Egg Parasite.
270. Subterranean Clover Weevil.
290. Wax Scale.
299. Blow-Fly Parasite (Red-Legged Chalcid).
325. Apple Curculio.
360. Web-Worm.
381. Insect Pests of Fruit Trees.
396. San Jose Scale.
409. Couch Grass Mite.
484. Fruit Fly.
501. Potato Moth.
532. Plague Grasshopper.
603. Sheep Blow-Fly Problem.
639. Stored Grain Pests.
647. Trapping Blowflies.
648. Control of Weevils in Wheat.
655. Termites or White Ants.
680. Some Insect Pests of Military Camps.
690. Poultry Pests.
712. Cabbage Butterfly.
723. Red-Legged Earth Mite.
724. Cockroaches.
754. Thrips.
762. Red Spider.
773. Clothes Moths and Carpet Beetles.
779. Snails and Slugs.
780. Bed-Bugs.
792. Vegetable Weevil.
811. Some Household Pests (Dried Fruit and Meal Insects).
812. Pear Slug.
820. Entomological Problems in the Ord River Irrigation Area.
836. D.D.T. as an Agricultural Insecticide.
847. Grasshoppers and Locusts.
879. Experiments with D.D.T. and 666.
882. Codlin Moth.
896. 1947 Grasshopper Conference.
932. Lucerne Flea.
941. Argentine Ant.
943. Mediterranean Fruit Fly (The Banana as a Host Fruit).
962. Argentine Ant—An Experience in Control.
1001. Aerial Baiting—For the Control of the Little Plague Grasshopper.
1007. Apple Leaf-Hopper—Control at Donnybrook.
1008. Fruit-Fly Control—Trials with New Insecticides.
1023. Climbing Cut-Worm or Tomato Moth.
1025. Pea Weevil.

Leaflet No.

1060. Argentine Ant.
1077. Insect Pests and Their Control.
1088. Webworm.

WEEDS, POISON PLANTS AND WEEDICIDES

103. Zamia Palm.
158. Common Thornapple.
310. Wild Turnip.
330. Chemical Weed Killers.
441. Skeleton Weed.
528. Tree Balsam or Gascoyne Poison.
657. Four Burr Grass Weeds, including Innocent Weed.
688. Poison Plants of Gascoyne Stock Route.
730. Cape Tulip.
769. Blackberry or Bramble.
884. Trials with Selective Weed Killers.
893. Bathurst Burr.
920. Bracken Fern.
933. Caltrop.
934. Ragwort.
978. Noogoora Burr.
1006. Chemical Weed Control—Recent Developments.
1047. Large Scale Chemical Weed Control in Crops.
1076. Pituri.
1097. Toxic Plants of the Guns Isotropes.

Leaflet No

VERMIN

438. Vermin Poisoning.
852. Dingo-Trapping and Poisoning.
926. Prepared Baits for Wild Dogs and Foxes.
1051. Destruction of Rabbits (also Emus, Kangaroos, Mice, Rats and Wedgetailed Eagles).

MISCELLANEOUS

93. Home Tanning of Skins.
802. Kimberley Project.
816. Canine Distemper.
890. State Agriculture Education.
994. Branding of Stock—Stock Management.
1027. Kimberley Research Station—Progress Report 1947-49.
1061. A Light Grading Implement.

TREES AND SHRUBS

561. Tung-Oil Tree.
977. Trees for the Wheat Belt.
1078. Jarrah and Karri.
1087. Shrubs for the Farm Home.
1096. Tuart and Illyarrie.

CALTROP WEED

THE Department of Agriculture has expressed concern at the spread of the noxious weed, Caltrop. Specimens of this weed have been received from a number of localities including Kondinin, Walgoolan, Carnamah, Morowa, Pingelly and Bruce Rock, adding considerably to the previously recorded range of this plant in Western Australia.

Caltrop is a prostrate summer growing annual with spreading stems which may extend for three feet or more from a strong taproot. Each leaf is divided into several pairs of leaflets and the yellow flowers are about one half inch across. The most conspicuous part of the plant, however, is the burr like fruit which separates readily into five wedge shaped segments each bearing four spines in pairs. The burr has often been compared and sometimes confused with the double-gee.

Caltrop has several undesirable features. The burrs cause mechanical injury to stock, the spines penetrating the frog of the hoof and giving rise to painful sores. Burrs ingested with other herbage have caused injury to the walls of the stomach and intestines. The plant also possesses toxic properties, stock losses due to it having been experienced in South Africa and also in Queensland and New South Wales.

Control measures should be designed to prevent seed formation. Plants not detected before seeds have formed should be handled carefully as the seeds scatter easily. Isolated plants should be destroyed by burning them in situ. For coping with large infestations, deep ploughing is inadvisable as the longevity of the seeds allows further germination when subsequent workings bring them to the surface. The objective should be to destroy the plants and induce germination in order to exhaust the seed supply present in the soil.

Chemicals have been found very useful for Caltrop control. The plants are killed by the application of oil sprays such as diesolene, kerosene or a mixture of one of these with old sump oil. This treatment also affects the germination of seeds in dry burrs. The 2,4-D or hormone-like chemicals also give good results but have little effect on the seeds and, therefore, must be applied at an early stage of growth in order to have maximum effect.

Farmers acquainted with the undesirable features of Caltrop do not have to be reminded that it is a primary noxious weed before taking active measures against it.

SUNRISE AND SUNSET TIMES FOR JULY-AUG., 1952

(Supplied by the Government Astronomer)

Times of sunrise and sunset for every fifth day, are given for a number of towns throughout the State. Times for a town not on the list may be estimated if its position in relation to one or more of the listed towns is known. The times given for sunrise are those of the first appearance of the top edge of the sun over a true horizon; those for sunset give the time of the sun's disappearance below a true horizon. Situation in a valley would make the sun appear to rise later, and on a hill it would appear earlier.

SUNRISE

Month.	Day of Month.	Broome.	Port Hedland.	Onslow.	Carnarvon.	Yalgoo.	Geraldton.	Moora.	Kalgoorlie.	Southern Cross.	Merredin.	Perth.	Tammin.	Northam.	Narrogin.	Collie.	Bunbury.	Katanning.	Bridgetown.	Hopetoun.	Esperance.	Cape Leeuwin.	Albany.
July	1	6·23	6·42	7·0	7·11	7·6	7·17	7·15	6·53	7·2	7·6	7·19	7·12	7·15	7·16	7·20	7·22	7·17	7·22	7·7	7·0	7·27	7·17
,, ...	5	6·23	6·42	7·0	7·11	7·6	7·17	7·15	6·53	7·2	7·6	7·18	7·12	7·15	7·16	7·20	7·22	7·17	7·22	7·7	7·0	7·27	7·17
,, ...	10	6·23	6·41	6·59	7·10	7·4	7·15	7·13	6·51	7·0	7·4	7·17	7·10	7·13	7·14	7·18	7·20	7·15	8·20	7·5	6·58	7·25	7·15
,, ...	15	6·23	6·41	6·59	7·10	7·3	7·14	7·12	6·50	6·59	7·3	7·16	7·8	7·11	7·13	7·17	7·19	7·13	7·18	7·3	6·56	7·23	7·13
,, ...	20	6·22	6·40	6·58	7·9	7·2	7·13	7·11	6·49	6·58	7·2	7·14	7·7	7·10	7·11	7·15	7·17	7·11	7·16	7·1	6·54	7·21	7·11
,, ...	25	6·21	6·39	6·56	7·6	7·0	7·10	7·8	6·46	6·55	6·59	7·11	7·4	7·7	7·8	7·12	7·14	7·8	7·13	6·58	6·51	7·18	7·8
,, ...	31	6·18	6·36	6·53	7·3	6·56	7·6	7·4	6·42	6·51	6·55	7·7	7·0	7·3	7·3	7·7	7·9	7·3	7·8	6·53	6·46	7·13	7·3
Aug....	1	6·18	6·36	6·55	7·3	6·55	7·5	7·3	6·41	5·50	6·54	7·6	6·59	7·2	7·2	7·6	7·8	7·2	7·7	6·52	6·45	7·12	7·2
,, ...	5	6·16	6·34	6·51	7·1	6·53	7·3	7·1	6·39	5·48	6·52	7·3	6·56	6·59	7·0	7·4	7·6	6·59	7·4	6·49	6·42	7·19	6·59
,, ...	10	6·14	6·31	6·48	6·56	6·48	6·59	6·56	6·34	5·43	6·47	6·58	6·51	6·54	6·55	6·59	7·1	6·54	6·59	6·44	6·37	7·4	6·54
,, ...	15	6·11	6·28	6·44	6·53	6·45	6·55	6·51	6·29	5·38	6·42	6·54	6·47	6·50	6·50	6·54	6·56	6·50	6·55	6·40	6·33	7·0	6·49
,, ...	20	6·7	6·24	6·40	6·48	6·39	6·49	6·45	6·23	5·32	6·36	6·48	6·42	6·44	6·44	6·48	6·50	6·44	6·49	6·34	6·27	6·54	6·43
,, ...	25	6·3	6·20	6·36	6·44	6·35	6·45	6·41	6·19	5·28	6·32	6·43	6·36	6·39	6·39	6·43	6·45	6·38	6·43	6·28	6·21	6·48	6·37
,, ...	31	5·59	6·15	6·31	6·38	6·28	6·38	6·34	6·12	5·21	6·25	6·36	6·29	6·32	6·31	6·35	6·37	6·30	6·35	6·20	6·13	6·40	6·29

SUNSET

Month.	Day of Month.	Broome.	Port Hedland.	Onslow.	Carnarvon.	Yalgoo.	Geraldton.	Moora.	Kalgoorlie.	Southern Cross.	Merredin.	Perth.	Tammin.	Northam.	Narrogin.	Collie.	Bunbury.	Katanning.	Bridgetown.	Hopetoun.	Esperance.	Cape Leeuwin.	Albany.
July	1	5·27	5·38	5·48	5·47	5·28	5·35	5·25	5·3	5·12	5·16	5·23	5·16	5·19	5·16	5·20	5·22	5·11	5·16	5·1	4·54	5·21	5·7
,, ...	5	5·28	5·40	5·50	5·49	5·30	5·37	5·27	5·5	5·14	5·18	5·25	5·18	5·21	5·18	5·22	5·24	5·13	5·18	5·3	4·56	5·23	5·9
,, ...	10	5·29	5·41	5·51	5·50	5·32	5·39	5·29	5·7	5·16	5·20	5·27	5·20	5·23	5·20	5·24	5·26	5·15	5·20	5·5	4·58	5·25	5·11
,, ...	15	5·31	5·43	5·53	5·52	5·35	5·42	5·32	5·10	5·19	5·23	5·31	5·24	5·27	5·23	5·27	5·29	5·19	5·24	5·9	5·2	5·29	5·15
,, ...	20	5·33	5·45	5·55	5·54	5·37	5·44	5·34	5·12	5·21	5·25	5·33	5·26	5·29	5·25	5·29	5·31	5·21	5·26	5·11	5·4	5·31	5·17
,, ...	25	5·35	5·47	5·57	5·57	5·40	5·47	5·37	5·15	5·24	5·28	5·36	5·29	5·32	5·29	5·33	5·35	5·25	5·30	5·15	5·8	5·35	5·21
,, ...	31	5·37	5·49	6·0	6·0	5·43	5·51	5·41	5·19	5·28	5·32	5·39	5·33	5·36	5·34	5·38	5·40	5·30	5·35	5·20	5·13	5·40	5·26
Aug....	1	5·37	5·49	6·0	6·0	5·44	5·52	5·42	5·20	5·29	5·33	5·41	5·34	5·37	5·35	5·39	5·41	5·31	5·36	5·21	5·14	5·41	5·27
,, ...	5	5·38	5·50	6·1	6·2	5·45	5·53	5·43	5·21	5·30	5·34	5·43	5·36	5·39	5·36	5·40	5·42	5·33	5·38	5·23	5·16	5·43	5·29
,, ...	10	5·39	5·52	6·3	6·4	5·48	5·55	5·47	5·25	5·34	5·38	5·46	5·39	5·42	5·40	5·44	5·46	5·36	5·41	5·26	5·19	5·46	5·33
,, ...	15	5·40	5·53	6·5	6·6	5·50	5·58	5·50	5·28	5·37	5·41	5·50	5·43	5·46	5·43	5·47	5·49	5·40	5·45	5·30	5·23	5·50	5·37
,, ...	20	5·42	5·55	6·7	6·9	5·53	6·1	5·53	5·31	5·40	5·44	5·53	5·46	5·49	5·46	5·50	5·52	5·43	5·48	5·33	5·26	5·53	5·40
,, ...	25	5·43	5·56	6·8	6·10	5·55	6·3	5·55	5·33	5·42	5·46	5·55	5·48	5·51	5·49	5·53	5·55	5·46	5·51	5·36	5·29	5·56	5·43
,, ...	31	5·43	5·57	6·10	6·13	5·58	6·7	5·59	5·37	5·46	5·50	5·59	5·52	5·55	5·54	5·58	6·0	5·51	5·56	5·41	5·34	6·1	5·48